

JOURNAL

of the

AMERICAN

VETERINARY MEDICAL

ASSOCIATION

UNIVERSITY OF CALIFORNIA

JUN 4 1941

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NUMBER**

VOLUME XCVIII, NUMBER 771

JUNE 1941

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Journal of the American Veterinary Medical Association

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600 S. Michigan Ave., Chicago, Ill.

VOL. XCVIII

JUNE 1941

NO. 771

Digestive Disturbances of Cattle*

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THE INTELLIGENT application of treatment for any disease condition resulting from functional disturbances of the digestive organs requires a knowledge of the physiology of the affected structures. Accordingly, the functions and some of the peculiarities of the fore stomachs, the true stomach and the intestines will be reviewed.

The rumen, reticulum and omasum are probably an evolutionary rearrangement of the true stomach. Their disposition is peculiar and highly significant, for when a study is made of them, it is realized that they are designed for the preparation of food for digestion. This feature is even more exemplified when ruminants as a whole are considered, for they have as their habitat every part of the globe and often live and thrive under rather extenuating circumstances, both in regard to climate and the character of the food they have to live upon. From the frozen wastes of the Arctic regions, where the caribou ekes out a living on the mosses of those countries, to the blistering sand and burnt grasses of the Sahara wildernesses, representatives of the ruminant species are found. Regardless of where they may be, there are no species of animals more useful to mankind,

for from them man feeds and clothes himself and has done so down through the ages.

When an endeavor is made to determine the reason that ruminants occupy such an important place in the welfare of mankind, one is led to the conclusion that it is in part at least because they have a rumen, reticulum and omasum, for it is through the medium of these organs that they are able to consume roughages and abstract the elements of nutrition necessary to maintain their own bodies and provide food for man. It is indeed remarkable the kind of food cattle will consume and the circumstances to which they will adapt themselves. The writer, in his boyhood days, recalls seeing cattle wintered in western Canada solely on a straw diet. These cattle were fed straw in the morning, turned out in the daytime to a strawstack around which they stayed and ate until evening, when they were stabled and again fed straw for a night ration. They were watered only once a day and although they consumed enormous amounts of straw, were seldom, if ever, sick or indisposed, and came through the winter in a fair state of nutrition. Each evening when they were observed in the stalls their rumens were apparently crammed full of straw. This performance was repeated day after day and week after week, yet the fore stomachs were equal to

*Presented before the Section on General Practice at the 77th annual meeting of the AVMA, Washington, D. C., August 26-30, 1940.

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the occasion and took care of this extraordinary task.

Another reference to the adaptability of cattle kind is seen in the following quotation received from a veterinary director in British Somaliland in northeast Africa: "Here it is very arid and the wells are far apart, but the old camel can go two or three weeks at a pinch without water, and so is well suited to the work. When not working, camels, sheep and cattle go for months without water, if the grazing is at all green."

Again when the great record-producing cows of the dairy breeds are considered, another illustration of the digestive capacity of ruminants is realized, for these records are the result of intensive feeding, the abstraction of the elements of nutrition and the secretion of them in the form of milk and butterfat.

The foregoing references serve to reveal the importance and the capabilities of the ruminant fore stomachs. The rumen is a great visceral sac having a capacity ranging from 30 to 60 gal., depending upon the size of the animal. Its mucous membrane is nonglandular and it does not secrete any known enzyme. Food is retained within it about 60 hours, and undergoes a thorough mixing, maceration and fermentation. It is designed for the reception and storage of roughage foods. Its great functions are motion, the breaking down of cellulose by fermentation and the extraction of nutrition from roughage by the process of maceration.

The reticulum, commonly spoken of as the second stomach, would be looked upon as a cul-de-sac of the rumen were it not for the peculiarly mapped-out arrangement of its mucous membrane. Its content is usually quite liquid in character and because of its position it becomes the receptacle for the heavier and foreign material swallowed. The functions of the reticulum are apparently to direct ingesta, particularly roughage, into the rumen, to regulate the passage of food into the omasum, to supply fluid to the rumen and to assist in the regurgitation of food during the act of rumination. The omasum is probably the least understood of all of the stomachs.

The food content between the laminae of the organ is usually of a doughy consistency and contractions of the organ are of a press or squeeze-like nature. Its only apparent function is that of the preparation of food for digestion.

The abomasum or true stomach is similar in function to the stomach of other species in that its secretions consist of rennin, pepsin and hydrochloric acid. However, an examination of its mucous membrane reveals certain modifications, for it rises up in great folds at its cardiac extremity which taper off toward the pylorus. The significance of this anatomical arrangement indicates a greater capacity for gastric secretion. This is in keeping with the inherent ability of cattle kind to consume and digest large quantities of food. It is quite probable also that this great area of mucous membrane has some relationship to the seriousness of gastric inflammations when encountered in this species.

The intestinal tract is long, has an extensive blood supply and has for its function, secretion, motion and assimilation. Except in the younger members of the species, disease conditions affecting the enteron are not as frequent as those encountered in the fore stomachs. This may be due in part at least to the fact that food consumed by ruminants is well prepared for digestion before entering the true stomach and intestines.

The term indigestion is used promiscuously and in ruminants is applied to a number of conditions which are more or less specific but are associated with a degree of indigestion. Indigestion of ruminants is an abnormal process (a diseased condition) due to a functional disturbance of the fore stomachs brought on by overfeeding, unlimited feeding, the consumption of damaged food and indigestible substances, by changes in the diet and seasonal influences. The character of the causative factor has much to do with the nature of the diseased condition and results in such disturbances as overloading of the rumen, impaction of the rumen, the stasis of food in the omasum, acute tympany and a gastro-

enteritis. Atonicity is common to all of these conditions.

OVERLOADING OF THE RUMEN

This title is significant of an abnormal accumulation of food in the rumen and it occurs chiefly in an accidental manner by cattle gaining entrance to a field of succulent grain or corn, or getting into a meal bin. It may be caused also by an overfeed of apples, or by unlimited feeding of any roughage cattle like. If the consumed gorge of food readily ferments and much gas is evolved, the condition of tympany may supervene.

The symptoms develop quickly. The patient stops eating, does not ruminate, manifests pain, grunts, and the left abdominal wall appears distended. A loss of motion in the rumen results and in some cases a toxemia with dullness and depression. The danger of the absorption of toxins, the result of fermentation and chemical changes occurring in the gorge of food, should never be overlooked. Cyanide poisoning, rape and turnip-top poisoning are illustrations of toxemias of this nature. Excessive eating of rape and turnip tops at a time when they are frosted and then thawed out leads to the occurrence of a peculiar digestive disturbance. Apparently some toxic agent is formed which results in a paralysis of the gastrointestinal tract and a degree of stupor. On other occasions, the gastrointestinal stasis is associated with a spasm of the bronchioles which is followed by a pulmonary emphysema and, as dyspnea becomes more acute, the emphysema proceeds from the lungs to the subcutaneous tissues in the cervical region and on over the back. Ultimately, in severe cases the entire body becomes emphysematous. Another confusing occurrence is occasionally encountered in cases of this nature when livestock men have drenched their animals with an Epsom salt solution. If a little of the drench should pass into the lungs or the mucous membrane of the true stomach be in a state of inflammation, the absorption of the Epsom salt may occur which is followed by stupor, coma and even death.

Ruminatorics Essential.—The treatment

and handling of such cases varies with the severity of the case. Laxative evacuants in the form of mineral oil and salines are usually administered but, while they have value in emptying out the intestinal tract, it should be remembered that they will not influence the rumen content. The rumen can not be emptied until motion and rumination are restored, and in this condition it is the organ primarily involved. Accordingly, the logical therapist selects drugs which are classed as ruminatorics and which exert their influence on the musculature of that organ. In this regard, drugs which influence the autonomic nervous system and have an emetic action are most useful. The emetic-acting agents are beneficial because they stimulate the act of regurgitation. Tartar emetic in 2- to 3-dr. doses dissolved in half a pint of water and given as a drench every six hours is one of the most reliable ruminatorics. Ammonium carbonate, nux vomica and fluid extract of ginger are also of value in this regard. Kneading the left abdominal wall tends to restore motion. On those occasions when the contents of the rumen are soggy and there are indications of stupor and visceral paralysis, rumenotomy or rumen lavage should be considered and applied.

When there is evidence of toxemia, manifested by stupor, one should not lose sight of the value of intravenous injections of sodium hyposulfite or possibly calcium gluconate, for both of these agents have detoxifying properties. Furthermore, the latter often assists in the restoration of motion in the static musculature of the gastrointestinal tract. The detoxifying properties of sodium hyposulfite are best illustrated in cyanide poisoning, but it has proved to be useful in other forms of toxemia as well.

RUMEN IMPACTION

Rumen impaction is a term applied to an abnormal accumulation of food of too dry a nature to readily undergo fermentation. It differs from overloading in that it is more gradual in its onset and the symptoms are not as marked. A gradually increasing atonicity, a lack of fluids, dry roughage, a lack of exercise and a vora-

cious appetite lend themselves to its occurrence. A typical case of this nature observed by the writer occurred in the following manner. The animal affected was stanchioned just back of the place in the feed passage where the roughage dropped as it was thrown down from the hay mow. Much of the dirt, the finer and shorter debris out of the hay, fell into her manger. In addition, she could reach over the manger into the passage and eat more of this same kind of material left lying where it had sifted out of the coarser roughage. She was a greedy feeder and ultimately developed a typical impaction. The dirt consumed in this case played a part in the development of the condition, for the weight of it undoubtedly interfered with the motility of the rumen, yet it did not indispose the animal markedly, for she continued to eat until impaction became pronounced.

The handling of these cases is much the same as recommended for overloading. More time, however, is usually required to correct the condition and in some instances a rumenotomy would hasten recovery by the removal of much of the load of the impaction which will have been interfering with the restoration of motion in the organ.

TYMPANY OF THE RUMEN

Tympany—an excessive accumulation of gas in the rumen—is doubtless the most common digestive ailment of the bovine species. It occurs in two forms: one in which the gas exists in a free state and collects in the upper compartments of the organ, the other in which the whole rumen content is a seething mass of actively fermenting material and the gas is for the greater part intermingled with the food. The former type of bloat is such as is seen in esophageal obstruction and occurs chiefly because regurgitation of gases can not take place owing to the occlusion of the lumen of the esophagus. The latter is the form that is encountered when cattle engorge with succulent food.

Because fermentation of the food content in the rumen is more or less constant, a

certain amount of gas is always found in the rumen and normally gas is eructated from time to time. On occasions, however, when cattle eat greedily of certain kinds of food, gas is formed more rapidly than it is expelled, or else it is so mingled with food that it can not be eliminated and a distention of the organ follows. With distention, intravisceral pressure increases, preventing and arresting motion and in a short time becomes so great as to cause marked dyspnea and very often death as a result of asphyxia.

Few, if any, contributions on the subject of tympany are seen in veterinary periodicals at the present time. Undoubtedly, this is because the condition is well understood, but there are certain features of the condition as it occurs when cattle are grazing on alfalfa which may not be generally known in the profession, and which the writer feels are worthy of consideration.

Previous to the 1937 season there were a number of years in which prolonged dry spells of weather occurred in Ontario. During those seasons large numbers of cattle were lost as a result of bloat. At times, on some farms, the owners were forced to keep a constant watch over their herds. Certain farmers sold their herds because of the difficulty they were experiencing with the condition. In these instances, it was not a case of one or two animals bloating; rather, whole herds were affected and created a serious problem for the farmers concerned.

Literature on the subject refers to the causes of tympany as being the overeating of succulent food. Veterinarians know that an overfeed of chop or any other food that has fermenting possibilities will give rise to bloating. Among the pasturages provided for animals, the legumes are most dangerous, particularly when cattle are first turned out into such forage, and also when it is damp or wet. Of the legumes used for pasture, alfalfa occupies the principal place wherever it can be successfully grown. While it is admitted that bloating may occur when cows are first turned in on it, also when it is wet and damp, this is not half of the story, for these theories

regarding this legume in particular are not constant. As a matter of fact, on those occasions referred to when large numbers of animals were affected, the cattle had been on alfalfa regularly and they would bloat whether the forage was wet or dry. It occurred during drouths when there was little or no moisture either in the form of rain or dew.

It is not easy to explain why bloat should occur with great frequency under these circumstances, but the writer is inclined to the belief that it may depend upon chemical factors within the plant itself, rather than any other feature. In discussing the matter with keen and observant livestock men, certain significant items have been learned. Among these is the fact that if the alfalfa is grown on land that has been fertilized and properly farmed, cows may pasture on it day in and day out with impunity. The following incident will afford a practical illustration.

An Oxford county farmer who keeps his land in a high state of fertility pastured his cows on alfalfa without having any trouble with bloat. His son purchased an adjoining farm which had become badly run down and his cows on an alfalfa pasture just over the fence were bloating. They undertook a simple experiment. The son's bloating cows were put in the home pasture and the father's cows which had not bloated were put in the pasture on the rundown farm. Now the disease picture changed in so far as the cows were concerned, for the father's cows began to bloat while the son's cows became normal. It is obvious that the reason must exist in the alfalfa itself.

On another farm, a farmer was having so much trouble with bloat in his herd that he sold the whole herd to another farmer who took them home and put them on alfalfa pasturage where the land was in a good state of fertility. No further bloating occurred in this group of animals. The farmers who have the least trouble with bloating are those whose alfalfa fields are in a high state of fertility, while those who have the greatest amount of trouble are farmers whose pasture lands are in a worn-

out condition. This feature may be looked upon as one of the most important when bloating occurs while cattle are on alfalfa.

There are other features which are worthy of consideration. Regardless of how good alfalfa may be, cows prefer grasses. How often it will be observed where there is a little grass growing in an alfalfa field that it is kept cropped down closely! Moreover, where both forms of pasturage are available, the cattle will spend more time on the grass and keep it eaten down closer than the alfalfa. This means that the grass is more palatable, more acceptable to them, and more satisfying. If then they are on a pasture where nothing but alfalfa is available, it is not reasonable to assume that the cattle may eat more alfalfa than they should in their desire to satisfy their appetite. Again, if cows are kept in the barns too long in the mornings at milking time and they are turned back on the alfalfa when excessively hungry, they may eat too much before stopping to ruminate. If they had been fed a little grain or dry roughage to appease their hunger before going to the pasture, the likelihood of bloat would have been greatly reduced. If the pasture in which cows graze is without shade, bloating will sometimes occur, particularly in excessively warm weather. Excessive warmth may lend itself to bloating in two ways. It causes the alfalfa to wilt and the consumption of wilted forage is, in the writer's opinion, just as dangerous as wet forage. The excessive heat also affects the cattle. If there is no shade available, the cattle may be observed standing about with their hair on end, dull and unquestionably affected by the heat. Under these circumstances, their digestive tract is not functioning, they do not ruminate and bloating may follow. All of these little things have their significance when one is considering the circumstances under which bloating occurs while cattle are on leguminous pasturage.

Treatment.—The treatment of this form of bloat is much the same as that occurring from other causes. However, with this type of disease the veterinarian must act quickly. The first object in treatment in

all cases where there is immediate danger of asphyxia is to relieve the distended organ. This is probably most quickly accomplished by the use of a trocar.

Another method consists of standing the animal high in front and passing a stomach tube. While the tube is in position, 2 qt. of water containing 1 oz. of creolin may be pumped into the rumen. The tube should be moved back and forth so as to distribute the creolin solution here and there throughout the cavity of the rumen. The creolin solution very effectually arrests fermentation. When one is using the stomach tube to reduce bloat, the purpose of standing the animal high in front is to allow the solid contents of the rumen to gravitate to the rear. This will bring the gas forward so that the moment the tube enters the rumen the gas escapes and the distention is overcome in a remarkably short time. The tube may plug with ingesta and if it does, a little water should be pumped through it, the pump disengaged and thus allow the gas to escape. In simpler cases a carminative and antacid drench is all that is required.

In some instances where the gas is mixed with the ingesta and the whole rumen content is a seething, fermenting mass, the trocar does not give the measure of relief desired. If extreme distention has occurred under such circumstances, a rumenotomy should be performed to allow the contents to spill out as quickly as possible. Before opening the rumen, suture its walls to the skin incision so as to prevent food from getting into the peritoneal cavity. Where a large number of animals are affected at the same time, the veterinarian would likely use different methods of treatment, depending upon the severity of the different cases.

GASTROENTERITIS

Probably the most common of abomasal and enteric conditions encountered are those in which an inflammatory reaction has occurred, and because it is difficult to differentiate between a gastritis and an enteritis, it is reasonable to consider them under the common heading of gastroenteri-

tis. Furthermore, it is not the intention in this article to deal with those forms of gastroenteritis which have as their cause infections, parasites or chemical factors, but rather those of dietetic origin and of a sporadic nature.

This form of the disease is most frequently encountered during the colder seasons of the year while cattle are being stable fed. It is caused by the consumption of damaged food, such as repeatedly eating frozen forage, improperly cured hay or roughage, heated cut grass, corn or silage and mouldy feeds. Younger animals of the species are more susceptible. It also occurs in animals that have been shipped long distances, fed too little *en route* and then fed too liberally at their destination. Sudden changes in the character of their diet and an overfeed of concentrates also will give rise to its occurrence. A number of animals in a herd may be affected from the same cause. Undoubtedly, infection enters on occasions as a secondary causative factor.

The symptoms are variable. Young animals react to pathogenic factors quicker than those which are more mature. Quite often a degree of indisposal may have been observed for two or three days, before severe symptoms appear. Affected animals often remain recumbent much of the time. They may rise promptly, but appear weak. There is dullness, grinding of the teeth and, in some, persistent pain occurs which is manifest by cautious movements, an expiratory grunt and switching. The surface and extremities of the body feel cold, the eyelids appear swollen, the eyeballs sunken and the mucous membranes tend to become icteric and bluish. Temperature recordings do not often reveal fever, but chilling may be observed. There is marked depression, a fast pulse and shallow but too frequent breathing. The digestive symptoms are complete anorexia in all severe cases, the mouth is clammy and has an objectionable odor. There is gauntness, exaggerated intestinal peristalsis and frequent evacuation of thin, watery feces. In some, large amounts of mucus may be passed with the feces while in others the feces appear dark, as if blood stained. Ultimately in some in-

stances, an intestinal stasis with profound toxemia occurs.

The prognosis of these cases should be guarded. The more favorable are those which retain their appetite.

Treatment.—In the handling and treatment of these cases, the hygienic measures which insure the comfort of the patient should be given first consideration. They consist of the provision of suitable quarters, cleanliness and warmth. The second item is the removal of the irritating material from the gastrointestinal tract; the most acceptable evacuant is mineral oil, for it lubricates and protects the irritated mucosa and tends to inhibit bacterial growth. The writer uses castor oil and mineral oil, equal parts in 1- to 2-pt. doses given as the initial dose and 1 to 2 pt. of mineral oil alone once a day subsequently. Antiferments or antacids also are indicated and for this purpose sodium bicarbonate, bismuth subnitrate and aromatic spirits of ammonia may be given. Tannic acid and opium preparations are also of value for violent purging. To combat weakness and exhaustion strychnine, 0.5 gr. three times a day, or caffeine may be administered. A quart of strong, black coffee given quite warm often has a powerful supporting effect. In dehydration from 1 to 2 liters of a 25 per cent dextrose solution given intravenously is of value.

When recovery is evident, due care should be taken to provide only easily digested and nutritive foods, and where there is evidence of gastrointestinal atonicity, liquor strychninae hydrochloridi and liquor arsenici hydrochloricus in equal quantities, given in 0.5 fluid ounce doses three times a day, makes an acceptable mixture for the attendant to administer at regular intervals. The strychnine is stimulating and stomachic while the arsenic apparently has a favorable influence on the metabolism of the damaged epithelium of the enteric mucosa.

COMMENT

There are many other digestive disturbances, but the foregoing are those with which the rural practitioner in cattle-raising

sections most frequently meets and which he should be most capable in handling.

Shortage of Veterinarians

The shortage of veterinarians was emphasized when the Panola-Tate County (Miss.) Livestock Association employed J. L. Arnandez of the federal service in Memphis, Tenn., to open headquarters at Como to practice on week-ends (Friday through Sunday). The nearest veterinarians are in Clarksdale and Memphis, notwithstanding that in the immediate region concerned there are 60,000 head of cattle, thousands of mules and many hogs which do not receive veterinary attention because the cost is too great to bring veterinarians such a long distance.

Checking Up on Bovine Tuberculosis

The following tabulation indicates the incidence of bovine tuberculosis in an Ohio county bordering on Lake Erie:

Year	Number tested	Reacted
1925	9,875	547
1931	10,204	57
1934	11,035	40
1938	9,903	75
1940	10,198	12

The figures are taken from a press report* prepared by the local Farm Bureau agent. The low incidence in 1940 despite the slight flare up of 1938 shows that the percentage of reactors is well below the required one half of one per cent and manifestly different from that of the first test in 1925, but it is nevertheless a warning to keep a watchful eye on bovine tuberculosis lest the ground gained be lost through the people's misunderstanding of the situation.

"What to do with Argentine corn?" is an international question of the first rank. With a bumper crop just put into the cribs and the European outlet completely closed, corn is being used for fuel as was done on several occasions in this country when the price dropped below the cost of shipping and livestock were a drug on the market.

*Sandusky (Ohio) Star Journal, April 2, 1941.

Westward Spread of Eastern Type Equine Encephalomyelitis Virus*

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ON THE North American continent, two types of immunologically distinct viruses of equine encephalomyelitis have been recognized: eastern type and western type. The areas in which these virus types have been isolated have had a sharp line of demarcation defining their boundaries in the Appalachian chain of mountains. Until 1939, these limits were without exception, but in that year a few cases of both types were isolated in the state of Alabama.

On April 29, 1941, portions of a horse brain from a civilian-owned animal were received by the Veterinary School, Army Medical Center, Washington, D. C., from Colonel Clifford O. Whitney, V. C., of Fort Brown, Brownsville, Texas. The specimen originated from that area southeast of Brownsville, bordering on the Gulf of Mexico and known as the "Boca Chica flats." Sixty horses had recently been reported in this area as having died of suspected encephalomyelitis.

Accordingly, 0.1 cc. of a 1:500 dilution of an emulsion of portions of the cerebrum and hippocampus from the specimen were inoculated intracerebrally into three normal guinea pigs. Within 72 hours all three had developed typical symptoms of encephalomyelitis, one died and two were destroyed while moribund in order to recover their brains.

A 1:500 dilution of an emulsion of portions of these two brains was then inoculated intracerebrally in 0.1-cc. amounts into three groups of guinea pigs. One group were immunized against the western type virus and another against the eastern type. The third group were normal control animals.

The animals belonging to the western immune type and the normal controls succumbed within less than 72 hours with

typical encephalomyelitis symptoms, while the animals of the eastern immune type remained normal.

The fact that the western immune-type guinea pigs were affected while the eastern remained normal and the fact that the incubation period was short (three days instead of the usual four days for western type virus) are certainly indicative of an eastern type of encephalomyelitis virus.

From the foregoing, it would seem that the geographic limitation of the virus entities has now been broken down.

Vanishing Food Supplies

The rapidity with which available food supplies can vanish is shown by the large proportion of the world's population that is now rationed by the enforcement of strict laws, after less than two years of curtailed production in the European nations. The rationing of millions for the actual necessities of life is too tragic for words to describe. Great populations famous for production of excellent food in ample quantities and for the great pleasure derived from eating it, are having their food doled out by the gram per soul, and the end is not in sight.

A dispatch to the *New York Herald* from London (*USDA*, Feb. 26), for example, says that the food minister has fixed the amount of food a diner in public places may eat. Meals must be limited to one course of meat, fish, eggs, poultry or cheese and any breach of the law on the part of the diner or server would result in heavy fines or imprisonment. While no one is actually hungry the restrictions are necessary to prevent a shortage, the dispatch explains.

The production of animals as sources of food and the part veterinarians play in that *métier* is the reason for calling attention to these misfortunes.

*From the Veterinary School, Army Medical Center.

Another Case of Equine Encephalomyelitis in New Jersey Pheasants^{*}

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New Brunswick, N. J.

ELSEWHERE¹ we have reported on the outbreaks of equine encephalomyelitis in New Jersey pheasants. The purpose of this report is to place on record another case which is of interest because there were no positively diagnosed cases of the disease in horses during the season.

Two pheasants showing nervous symptoms were submitted on October 15, 1940. There were no gross changes on autopsy, and cultures made on agar were negative. Two samples of brain were removed aseptically by means of capillary pipettes from the bird killed on October 16. Each sample was emulsified in about 2 cc. of broth and each of four 11-day-old embryonated eggs was inoculated with 0.25 cc. of the emulsion. The material inoculated gave no growth on agar plates. Five of the eight eggs inoculated were dead in about 18 hours, two in about 24 hours, and the last died sometime between 24 and 36 hours. With two exceptions the embryos showed uniform reddening and the vessels surrounding the yolk sac were injected. These changes are suggestive of the growth of encephalomyelitis virus.

On October 19, a neutralization test was set up in which eggs receiving the same virus dilution and serum were inoculated in triplicate, and those receiving virus and broth were inoculated in duplicate. Each egg received a mixture of 0.05 cc. of the virus dilution and an equal amount of serum or broth. The virus suspension was prepared by grinding the serosa and liver from one embryo in about 5 cc. of broth with sand. The suspension was frozen, thawed and centrifuged before dilutions

were made. The eggs were candled in the morning and evening until death of the embryo or hatching. The immune eastern type serum was the same as that used in previous tests and for which we are indebted to Dr. C. Ten Broeck of the Rockefeller Institute. The results are shown in table I. These data show some but not marked neutralization of virus.

HISTORY OF OUTBREAK

The outbreak occurred about 4 miles south of Mays Landing in Atlantic county in an area in which the disease occurs in horses. The first pheasants were brought here in 1937, and 25 or 30 birds were used as breeders that year. There were no unusual losses until 1940, and no cases suggestive of the present disease. This spring 120 pheasants were purchased from Missouri of which all but 30 hens and 6 cocks kept for breeding were liberated in the area. Three lots of hatching eggs also were brought from Missouri. A complete hatching record is not available, but from the purchased eggs and those produced on the place it is estimated that about 1,100 pheasants were hatched in ten hatches at intervals of eight days. Eight of the hatches between May 26 and July 21, on which records are available, produced 786 pheasants. There were two hatches before May 26.

The pheasants were brooded artificially and transferred to holding pens at the age of 6 to 8 weeks. The enclosed holding pens were arranged somewhat as in figure 1.

The earliest hatches were placed in pen B, and about September 15, a lot of 447 of the oldest birds was sold, thus leaving about 70. When the place was visited on October 22, these birds were 16 to 18 weeks of age and had been in the pen for eight weeks. They had not contracted the disease

^{*}Journal series paper of the New Jersey Agricultural Experiment Station, Rutgers University, Department of Poultry Husbandry.

¹Beaudette, F. R.: Equine encephalomyelitis in avian hosts. Proc. 43rd Ann. Meet., U. S. Live Stock San. Assn., 1939 (1940), pp. 185-201.

TABLE I—Results of Neutralization Test with Eastern Type Immune Serum and Pheasant Virus

MIXTURES	DILUTION OF VIRUS				
	10— ³	10— ⁴	10— ⁵	10— ⁶	10— ⁷
Virus and serum	D 10/20 p.m. D 10/20 p.m. D 10/20 p.m.	D 10/20 p.m. D 10/21 a.m. D 10/20 a.m.	D 10/21 a.m. D 10/20 p.m. D 10/20 a.m.	D 10/20 a.m. Hatched Hatched	Hatched D 10/21 a.m. Hatched
Virus and broth	D 10/20 a.m. D 10/20 p.m.	D 10/20 a.m. D 10/20 a.m.	D 10/20 a.m. D 10/20 a.m.	D 10/20 p.m. D 10/20 p.m.	D 10/20 a.m. Hatched

D indicates death of embryo.

from the birds in the adjoining pen A, although it had existed there for about three weeks. The disease never reached pen B.

Later hatches were placed in pen A, but 218 were transferred before October 1 to a 5-acre enclosed field about one-half mile away. Two or three days after this transfer, losses began and 67 dead had been removed by October 22. In the end only 38 birds of this lot survived, but predatory birds probably accounted for about 37 losses. In other words, encephalomyelitis accounted for a loss of about 143, or 65 per cent, of the original population of 218.

After the above birds were taken from pen A, the ground was plowed and in about a week 173 pheasants were placed in the pen (about October 1). The first losses apparently occurred on October 17, when five birds died, and the daily mortality in successive days was 7, 5, 3, 8, and 15 on October 22. The daily mortality is not known after this date, but by November 11 only 36 birds remained and two dead birds had been removed that morning. The owner

believes that three or four birds recovered.

Pen C contained a series of quail brooders, but the quail were never affected. The brooders were protected by fly screen.

Pen D contained 26 old breeders, but the disease never reached this pen in spite of its separation from pen A only by a wire fence.

Since the mode of spread in pheasants is not known, it might be well to mention all observations made with the idea that with future findings these observations may be significant. The game farm was about one third of a mile from tide water. The area has many so-called pot holes which tend to dry up in July. Mosquitoes and ticks were abundant this year. The first frost occurred on October 18 and some snow fell on October 19. Ticks were said to have disappeared about October 1 and mosquitoes were not seen after the frost, but they reappeared later and finally disappeared about the middle of December, which practically coincides with the last mortality from encephalomyelitis. Rats were numerous around several buildings.

Ninety birds of the 1939 hatch were liberated in the area about March 15, 1940, and these raised young, but all of them disappeared about July 15.

In December it was learned that just before the 218 birds in pen A were transferred to the enclosed field, a small wild rabbit and some wild quail had gained entrance to pen A and were left there for several days. The rabbit was picked by the pheasants and had or developed a tumor-like growth which was observed when the

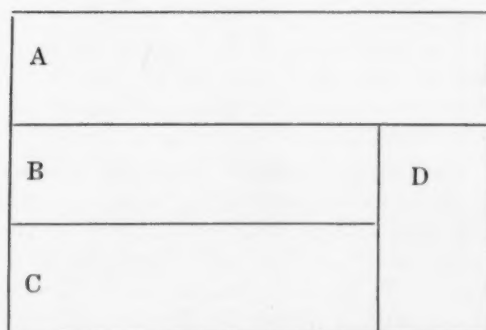


Fig. 1. Arrangement of holding pens.

Brief History of Infectious Equine Encephalomyelitis and Related Affections in the United States*

JOHN R. MOHLER, V.M.D., A.M., Sc.D.

Washington, D. C.

1847-1849. — Cases of "cerebrospinal meningitis" described by Large.

1869. — Similar cases reported by Liautard.

1897. — "Cerebrospinal meningitis" in Idaho horses reported by Williams.

1900. — Pearson reported on so-called forage poisoning of horses. (Careful study of the available information in these four early reports indicates that the cases were not infectious equine encephalomyelitis but, rather, forms of toxic encephalitis.)

1908. — Cases in Louisiana horses, described by Milks, at present regarded as what is now known as infectious equine encephalomyelitis.

1912. — Kansas-Nebraska horse plague, probably the same as present-day "sleeping sickness," studied by Mohler, Udall, Kinsley and others.

1918-1919. — "Horse plague" encountered in other sections of the United States. Preceding and after this epizootic, sporadic cases of suggestive nature were more or less common.

1930-1931. — Discovery and study in California of the filtrable virus of infectious or epizootic encephalomyelitis made by Meyer, Haring and Howitt. The virus was differentiated from the viruses of poliomyelitis and Born disease by Howitt and Meyer.

1933. — Kelser transmitted western type

*From the Bureau of Animal Industry, U. S. Department of Agriculture.

(Continued from preceding page)

rabbit was caught for removal.

Finally, a science teacher in the Pleasantville High School, Mr. Wm. W. Tullner, who was familiar with the outbreak, claims to have seen paralyzed clapper rails on the meadows and these were known to visit the game farm.

virus from guinea pig to guinea pig and to a horse through the bites of *Aedes aegypti*, the so-called yellow fever mosquito. (Madsen and Knowlton; Merrill, Lacaille and Ten Broeck; Simmons and Reynolds; Kelser, Giltner and Shahan; Davis, and others later confirmed Kelser's work and added nine other species of *Aedes* found to be capable of transmitting one or both types of virus experimentally.)

Ten Broeck and Merrill, and Giltner and Shahan, reported on a highly fatal type of virus immunologically distinct from Meyer's virus. This became known as eastern type, and the California virus and its homologues as western type.

Records and Vawter described the further development of anti-encephalomyelitis serum, first studied by Meyer, Haring and Howitt.

Records and Vawter conducted field trials of vaccination with active virus, later using active virus and serum simultaneously.

The disease later referred to as "secondary" or "X" disease, following an epizootic of infectious equine encephalomyelitis in Utah, was reported by Madsen.

1934. — Formalinized brain tissue from infected horses was reported to be immunogenic for guinea pigs and horses by Shahan and Giltner. Field trials on horses were conducted in Delaware and Virginia.

Olitsky, Cox and Syverton reported observed similarities in pathology due to the viruses of vesicular stomatitis and equine encephalomyelitis, with no cross immunity.

1935. — Higbie and Howitt propagated the virus of the disease in chicken embryos.

Shahan and Giltner reported further studies of formalinized brain-tissue vaccine.

Ten Broeck and Traub reported on the use of active virus "modified" by succes-

sive passages in pigeons as a protective biologic in horses.

Toxic encephalitis caused extensive losses in horses in the Midwest in the late fall and winter (1935-1936).

The United States Bureau of Animal Industry initiated a program of collection and dissemination of epizootiologic data on infectious equine encephalomyelitis—23,512 cases reported.

1936.—Cox and Olitsky reported confirmatory studies showing the development of resistance of high degree in guinea pigs and mice with formalinized brain-tissue vaccine. The injection of serum prior to the injection of either living or formalinized virus was found to prevent immunizing action by the latter.

Syvertson and Berry demonstrated transmission of western type virus by the Rocky Mountain spotted fever tick, *Dermacentor andersoni* Stiles.

Cox reported on tissue culture of the virus of equine encephalomyelitis.

Biester and Schwarte pointed out the significance of histopathologic examination in the differentiation of toxic encephalitis, specifically, mouldy corn poisoning, and virus-induced encephalomyelitis.

Graham reported studies of toxic encephalitis or mouldy corn poisoning.

Schwarte, Biester and Murray produced leucoencephalomalacia, a form of toxic encephalitis, by prolonged feeding of mouldy corn in Iowa, elaborating on the work of Butler, and of MacCallum and Buckley, in 1902.

There were reported to the Bureau 3,929 cases of infectious equine encephalomyelitis.

1937.—Marsh reported on "secondary" or "X" disease.

Howitt described the complement-fixation test in the differentiation of the viruses of equine encephalomyelitis, lymphocytic choriomeningitis, and St. Louis encephalitis.

The possibility of relationship of streptococci to encephalomyelitis virus was announced by Rosenow.

Wyckoff reported the isolation of a homogeneous heavy component from east-

ern type infectious equine encephalomyelitis tissues by differential ultracentrifugation.

There were reported to the Bureau 173,889 cases of infectious equine encephalomyelitis.

1938.—Beard, Finkelstein, Sealy and Wyckoff reported on the high antigenicity of formalinized chicken-embryo tissue vaccine for guinea pigs. Confirmatory studies in laboratory animals and horses were reported by Eichhorn and Wyckoff, Lyon and Wyckoff, Mitchell, Walker and Plummer, and the Bureau of Animal Industry. The product was produced commercially and widely used in the latter part of the encephalomyelitis season.

Chemical changes in the blood serum of cases of mouldy corn poisoning and infectious equine encephalomyelitis were observed by Millen and Eveleth.

Fothergill, Dingle, Farber and Connerley, and Webster and Wright demonstrated eastern type equine encephalomyelitis in human cases of encephalitis, substantiating Meyer's contention as to the susceptibility of man.

Howitt identified western type virus in human cases.

Fothergill and Dingle demonstrated the equine virus in naturally infected pigeons.

Tyzzar, Sellards and Bennett found the virus in ring-necked pheasants.

Schoening, Giltner and Shahan conclusively identified a strain of virus from a child as indistinguishable from eastern type equine encephalomyelitis virus by a test in horses.

There were reported to the Bureau 184,662 cases of the equine disease.

1939.—William M. Mohler described the use of chicken-embryo antigen in the complement-fixation test for infectious equine encephalomyelitis.

Olitsky reported studies on avian encephalomyelitis, known also as epizootic tremor of chicks, differentiating the virus from that of equine encephalomyelitis.

Additional cases of human encephalitis attributed to equine virus, including laboratory infections, were reported. Beard, Beard and Finkelstein, and Wyckoff re-

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ported on the use of formalinized embryo vaccine as a prophylactic in man.

Studies of "secondary" or "X" disease were reported by Shahan, Giltner, Davis and Huffman. The tentative designation, toxic hepatogenous icterus, in preference to the previously used ambiguous terms, was suggested by Mohler.

There were reported to the Bureau 8,008 cases of infectious equine encephalomyelitis, with 2,471 deaths.

An estimated 3 million horses and mules received prophylactic treatment with embryo vaccine. The widespread application of vaccine, together with generally low rates of precipitation, is believed to have been a contributory influence in the relatively low incidence of the disease.

1940.—Some serious reactions and deaths occurred as the result of vaccination with embryo vaccine, as in 1939. In order to lessen or eliminate these, if possible, studies of intradermic vaccination were made by Schoening, Shahan, Osteen and Giltner. The results indicated equal if not superior protection, without serious reactions, from this method of administration, and the technic was widely adopted during the latter part of the season.

Kitselman and Grundmann reported demonstration of equine encephalomyelitis virus in *Triatoma sanguisuga*, or assassin bugs, collected in areas in Kansas where the disease had been epizootic.

Studies of purification and concentration of equine encephalomyelitis virus by ultracentrifugation and chemical manipulation were made by Beard and associates.

A summary of the Bureau's studies on isolation and typing of equine encephalomyelitis virus and on diagnosis in general was offered by Shahan, Giltner and Osteen. (Both types of virus were found in Alabama in 1939.)

1941.—The Bureau report on the disease in 1940 in the United States was issued in April 1941.*

There were reported 16,941 cases of encephalomyelitis and 4,187 deaths. An esti-

mated 1 million horses and mules were vaccinated.

Questionnaires covering the 1941 season were sent out in May.

Syverton and Berry report the hereditary transmission of western type virus in the tick, *D. andersoni* Stiles.

For the 1941 season, vaccine for intradermic use only is being prepared.

The Extremist

We must admit that behind many a reform, behind many a movement that has sent this old world of ours forward at a pace that belied its years, has stood pretty nearly always the extremist—the man, or woman, who has refused to grant for an instant that there could be two sides to a question. There was only one side—their side; with them the right, against them the wrong. This seems to be the way some are made; the capacity to see the other side is absent.

In the end, however, the long campaign against the specific evil, be it what it may—child labor, intemperance, slavery, cruelty to the animal world—is fought out by the rank and file of those who have never taken the extreme view, but who, at last, when the issue was fairly joined, have cast their influence on the side of what has seemed to them the right. That the issue came finally to be joined, this no doubt has been due to the few unrelenting and uncompromising agitators.

Among the humane workers of the world there are these two classes: the smaller number who will give or take no quarter in the battle against what to them is cruelty; the larger number, kind, earnest, honest men and women who would not injure unnecessarily the least of God's lowlier creatures, but who yet do not and can not rank all life as of the same sacred value, and who can not bring themselves to believe that all scientific men are heartless, cruel, unscrupulous.—*Our Dumb Animals*.

We have not yet learned to live with the abundance we can create.—*Wallace's Farmer*.

*See May 1941 issue of the JOURNAL, pp. 381-383.

Experiments with Crystal-Violet Vaccine for the Prevention of Hog Cholera*

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FOR MANY YEARS, research workers have endeavored to produce a vaccine from the blood of cholera-infected pigs. Numerous chemical agents, heat, cold and desiccation have been used in attempts to destroy or attenuate the disease-producing properties of the blood and at the same time preserve its antigenic properties.

Investigators have been encouraged by the results of certain experiments, only to find that similar results could not be obtained in subsequent experiments carried out in exactly the same manner.

The need for an immunizing agent which would produce immunity against hog cholera without the danger connected with the use of live virus has long been recognized.

The use of anti-hog-cholera serum in conjunction with hog-cholera virus, known as the serum-virus method of immunization, or vaccination, has been of inestimable value in the prevention of hog cholera and this method of immunization is now employed extensively throughout the world. However, there have always been certain inherent drawbacks associated with this valuable prophylactic method.

The chief objection to the serum-virus method of immunization is the fact that a live and active virus is used in conjunction with the serum. When a live virus is injected into a susceptible hog, even with large doses of serum, a reaction always follows. This reaction, in the majority of cases, is invisible. However, experiments conducted by the Bureau have shown that a leucopenia regularly follows the simultaneous inoculation of serum and virulent blood, even in pigs which exhibited no fever

and no visible symptoms. When the dose of serum was nearly double the amount required to prevent the development of visible symptoms, the leucopenia was still observed. In addition, there is the well-established fact that the simultaneous inoculation is always followed by the appearance of the virus in the blood, where it circulates for two or three weeks even though there is no rise of temperature and no visible reaction.

In the case of perfectly normal and healthy swine, there is no danger from serum-virus immunization, but when secondary bacterial infections are present at the time of vaccination or are picked up shortly thereafter, the method may be fraught with danger, for the virus seems prone to activate such infections. Not only are bacterial infections, infestations with parasites, nutritional disturbances, and other debilitating conditions apt to be made more severe by the reaction following serum-virus vaccination, but also the serum-virus reaction is itself likely to be intensified by the presence of any debilitating condition.

With a view to overcoming these objectionable features connected with the serum-virus method of immunization, officials and research workers in the Bureau of Animal Industry have had in mind for many years the development of a vaccine which would afford a safer and cheaper method of immunization. Much time and a great amount of work have been devoted to the preparation and testing of experimental vaccines at the Bureau's experiment station at Ames, Iowa, during the past 15 or 20 years.

CRYSTAL-VIOLET VACCINE

Crystal-violet vaccine is a modified virus made from the defibrinated blood of cholera

*From the field station of the Pathological Division, Bureau of Animal Industry, U. S. Department of Agriculture; presented at the annual meeting of the Illinois State Veterinary Medical Association, Springfield, Ill., January 23-24, 1941.

pigs. It obtains its name from the fact that crystal violet, an aniline dye derived from coal tar, is the principal attenuating agent used in its preparation. The late Marion Dorset, former chief of the Biochemic Division of the Bureau of Animal Industry, was the originator of the idea of using this dye in the production of hog-cholera vaccine.

The first lot of crystal-violet vaccine was prepared in November 1934, at the Bureau's experiment station at Ames. The dye was first used alone and later in combination with several other chemical agents. Many experiments were conducted before a formula was discovered which could be used repeatedly with satisfactory results. The present formula was first used in May 1936, and since then many lots of vaccine have been prepared by the same method which is briefly as follows:

To 800 cc. of selected defibrinated hog-cholera blood, 100 cc. of a 3 per cent solution of disodium phosphate is slowly added while stirring. Next, 100 cc. of a 0.5 per cent solution of crystal violet is added in the same manner. The mixture is placed in an incubator and left there for two weeks at a temperature of 37.5° C. Bacteriologic examinations are made of the tissues of the pigs furnishing the virus and of the vaccine when it is removed from the incubator. After removal from the incubator the vaccine is kept in a refrigerator.

POTENCY TESTS

Pigs weighing from 40 to 70 lb. and of known susceptibility were used in these tests. A four-pig test was made of each vaccine as soon as possible after its preparation.

At first, the vaccines were tested in 5-cc. and 10-cc. doses. Later, the test doses were reduced to 3 cc. and 5 cc., and still later were further reduced to 2 cc. and 4 cc. All potency tests are now being made in 3-cc. and 5-cc. doses.

In conducting these tests the vaccine is injected in the loose tissues of the ham, beneath the subcutaneous tissue and fascia, but not in the muscular tissue. Two of the test pigs receive the lower dose and two the higher dose of vaccine. The test pigs are placed in clean, disinfected, outside pens and kept under careful observation and away from exposure for three weeks, previous tests having demonstrated the fact that an interval of from two to three weeks is required to establish immunity. No tempera-

tures are taken during this time in order to avoid the possibility of transferring infection. The pigs are then given an injection of 1 cc. each of virus of known virulence and carefully observed for another two weeks. Five weeks are thus required in carrying out the potency tests.

Three hundred and forty-two pigs have been used in potency tests of vaccine prepared by the above-described method and only five of these showed sickness of any kind during the interval between the vaccine injection and the time of exposure. In no case was the sickness attributed to hog cholera. Of these test pigs, 339 were exposed to cholera and kept under observation for two weeks thereafter. When these tests were completed, it was found that 98.23 per cent of the pigs were adequately protected against hog cholera. The group considered as adequately protected included the pigs that remained normal and those that showed only a slight reaction. These tests have demonstrated that the method used in the preparation of the vaccine had in all cases attenuated the virus to a point where it would no longer produce hog cholera in from 1-cc. to 10-cc. doses and that vaccine-treated pigs possess a high degree of immunity three weeks after the vaccine is administered.

KEEPING QUALITIES OF CRYSTAL-VIOLET VACCINE

In a preliminary or progress report made in 1936, experiments were reported showing that the vaccine retained its potency remarkably well when held in cold storage.

With a view to obtaining more data on this point, four lots of old vaccine which had been in storage for periods of approximately one, two, three, and four years were selected for retests of potency. A four-pig test was made of each sample in the same doses that were used in the first potency tests, carried out at the time the vaccines were prepared. All these old lots of vaccine, from one to four years old, afforded perfect protection to the test pigs. This would indicate that the potency of crystal-violet vaccine is retained exceptionally well under cold-storage conditions.

Experiments have also been carried out to determine the effect of relatively high and prolonged temperatures on the potency of the vaccine. Different lots of vaccine were held for periods of two, four, six, and eight weeks at incubator temperature, which would be equivalent to a high summer temperature in most parts of the United States, and were then tested for potency. In these experiments prolonged exposure of the vaccine to a temperature equal to a high summer temperature had no deleterious effect on the potency of the vaccine. In another experiment a sample of vaccine was

held for two weeks at 50° C. (122° F.) without impairment of potency.

It would thus appear from the experiments just cited that the vaccine retains its potency exceptionally well under cold-storage conditions and that it also withstands remarkably well temperatures equivalent to and in excess of a high summer temperature. It might, therefore, be assumed that the vaccine is capable of withstanding considerable abuse in regard to temperature, but it is nevertheless considered highly advisable that the vaccine, like other biological products, be held under cold-storage conditions.

FARM TESTS OF CRYSTAL-VIOLET VACCINE

In carrying out these experiments, the nature of the new vaccine was carefully explained to each cooperating farmer. It was pointed out and emphasized that the treatment was in an experimental stage and its limitations as well as advantages were fully explained. The farmers were assured that the method was a safe one and that no ill effects would follow vaccination of their herds. They were also told that because of the slow development of immunity the vaccine should not be used in a neighborhood or community where hog cholera was known to be prevalent. Herds were, therefore, selected for treatment in communities where cholera did not prevail.

In the treatment of farm herds, every precaution was taken to prevent the introduction of disease. Equipment and clothing were used which had not come in contact with hog-cholera virus.

The herds were not kept under observation following vaccination, as this was not considered necessary in view of the absence of any symptoms of sickness in experimental and test pigs at the Bureau station.

The farmers were informed that the vaccine appeared to protect the treated animals through the usual fattening period, but no guarantee was given as to the duration of immunity. Retreatment with vaccine or serum-virus treatment at the end of eight months was advised for animals to be kept for breeding stock.

The treatment was administered free of charge with the one proviso that when the pigs were ready for market, a certain number of animals from each herd, usually four, would be delivered to the Bureau station for an immunity test. These hogs were purchased at the prevailing market price or immune hogs of equivalent value were given in exchange.

News of the new treatment spread rapidly throughout the surrounding country and farmers made applications for the treatment in large numbers. The first farm herd was treated on November 5, 1935, near the Ames station. Since that time, 236 herds containing 12,572

pigs have been treated. In order to ascertain whether the vaccine possessed or would regain virulence during animal passage, 151 untreated controls were left in 79 of these herds, and no sickness developed in these pigs.

METHOD OF ADMINISTERING VACCINE AND DOSAGE

The vaccine was administered by subcutaneous injection on the inner side of the thigh. Pigs weighing under 75 lb. received a 5-cc. dose while those weighing over 75 lb. were given a 10-cc. dose. In a limited number of herds, a portion of the herd was given two treatments administered two weeks apart. Ear marks were used to identify the various groups.

Herd owners were instructed to report in case sickness of any kind developed. In only two of the 236 herds treated did any disease develop which required an investigation. Sickness developed two weeks after treatment in one herd and two months after treatment in the other. In both cases lesions were found which could be regarded as suspicious of cholera and both herds were treated with serum and virus. However, two pigs were purchased by the Bureau from each of these farms and left in the herds without any treatment except the original vaccine treatment. All of these pigs remained normal.

The treatment of 236 herds consisting of 12,572 pigs, with sickness developing in only two herds during the fattening period, would seem to furnish evidence that the crystal-violet vaccine is a safe product to use.

IMMUNITY TESTS

As previously stated, when the vaccine-treated hogs were ready for market a number of hogs were selected from as many herds as possible for the purpose of testing their immunity.

These hogs were brought to the experiment station and injected with 2 cc. each of tested virus. In a few cases pen exposure was substituted for virus injection.

Removing hogs from farm herds and subjecting them to changes in feed, care and housing conditions in addition to an injection of hog-cholera virus constitute a severe test. Furthermore, many of these tests were conducted during severe winter weather. Had it been possible to expose these hogs on farms under their normal surroundings, it is probable that the results would have been somewhat better. Any symptom of sickness following exposure was recorded as a reaction regardless of the cause or nature of the sickness.

The interval between vaccine treatment and exposure varied from two to twelve months, the majority of the hogs exposed at from five to eight months.

In all, 647 hogs from 166 farm herds treated with vaccine prepared by the above-described

method have been subjected to immunity tests. A number of these pigs were treated by procedures which would not be considered good practice in the light of present knowledge. However, the results of the tests with such pigs are included in the following summary:

Five hundred and thirty-five pigs, or about 83 per cent, remained normal or showed only a slight reaction. About 12 per cent showed severe reactions and about 6 per cent died or were killed in worthless condition.

An example of improvement in results due to a change in procedure is as follows: When the practice of treating pigs under 8 weeks of age was discontinued and treatment confined to pigs over that age, death losses following exposure decreased from 11.64 per cent to 3.28 per cent.

By segregating the farm herds which were treated by procedures now recognized as good practice, i.e., those herds which were treated when 10 weeks of age or over and exposed at not more than eight months thereafter, the percentage of protection is considerably higher. The summary of herds treated by this procedure is as follows: 214 hogs from 55 herds were exposed; 190, or 89 per cent, were adequately protected; 10 per cent showed severe reactions and only 1 per cent died.

The fact that the hogs in the group which exhibited severe reactions recovered and a number of those in the group which succumbed, died from causes other than hog cholera would indicate that considerably more than the 83 per cent of the farm hogs that were subjected to immunity tests had received some protection from the vaccine treatment.

DURATION OF IMMUNITY

While the duration of immunity following treatment with crystal-violet vaccine has not, as yet, been definitely established, the vaccine seems to protect swine against cholera quite well through the fattening period, provided they have not been treated when under 8 or 10 weeks of age.

VACCINE TREATMENT OF PIGS NURSING NONIMMUNE AND IMMUNE SOWS

The observation was made in the course of earlier experiments with crystal-violet vaccine that there was a distinct interference in the antigenic action of the vaccine when anti-hog-cholera serum is given at the same time as or shortly after the vaccine. The passive immunity from the serum evidently interfered with the usual antigenic action of the vaccine.

With a view to determining whether a similar interference might occur when the vaccine was given to pigs nursing immune sows, an experiment was carried out at the Bureau sta-

tion in which a group of little pigs nursing non-immune sows and another group nursing immune sows were treated with crystal-violet vaccine and later exposed by virus injection with a striking difference in results. The protection afforded the first group was 100 per cent and the second group, only 61.5 per cent. This would indicate that the natal immunity in pigs nursing immune sows interferes with the antigenic action of the vaccine in a manner similar to that noted in the experiments where anti-hog-cholera serum was given in conjunction with the vaccine or shortly thereafter.

TESTS OF CRYSTAL-VIOLET VACCINE IN COÖPERATION WITH PRACTICING VETERINARIANS

In the spring of 1940, arrangements were made for the distribution of the vaccine through government channels to veterinarians in various parts of the country in order that the new product could be tried out in the hands of practitioners and results compared with those obtained in farm tests around Ames. Vaccine has been distributed to veterinarians in Iowa, Illinois, and several eastern states. Sufficient time has not yet elapsed for a report on this project.

Corn Roots

The roots of the corn plant (*Zea mays* L.) may burrow to the depths of 4 to 8 ft. and grow lateral extensions ranging from 2 to 4 ft. from the plant. In total dry weight and length of roots hybrids greatly exceed the inbred lines. From experiments carried out at the Wooster (Ohio) station,* tables and drawings showing root development of corn at different dates after planting explain, inferentially, why corn is a fairly dependable crop in spite of weather variations.

The University of Wisconsin has issued a warning to farmers against the claims of unknown peddlers of livestock remedies, especially peddlers of remedies which are effective only in the hands of trained veterinarians.

*Spencer, J. T. A comparative study of the seasonal root development of some inbred lines and hybrids of maize. *J. Agr. Res.*, lxi (Oct. 1940), pp. 512-538.

Meat-Inspection Aspects of Trichinosis*

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UNLIKE other parasites that are encountered from time to time in the edible portions of carcasses used for human food, trichinae that are encysted in the muscles of hogs are not visible to the naked eye. Pork that is infected with trichinae does not differ in appearance, texture, odor, or in any other readily discernible manner from pork not so infected. Since postmortem inspection of food animals is made largely by sight and touch, even the best routine inspection of swine carcasses can give no guarantee that they are free from trichinae. There is no practical method of discovering the presence of the parasites in the live host animal. It is not surprising, therefore, that swine carcasses that have been passed for human food under rigid meat inspection, such as is enforced by inspectors in all establishments operating under government supervision, may, and actually do, in some cases, contain live trichinae.

REVIEW OF FINDINGS ON TRICHINOSIS

In trichina infections of long standing the cysts in the muscles and even the parasites themselves may have become calcified. If such calcified cysts are numerous, they can be seen by the naked eye as small, chalky spots distributed throughout the muscles. It was this circumstance that first led to the discovery of trichinae in human bodies that came to necropsy in hospitals in England in the early part of the 19th century. In the case of hogs, however, such macroscopic evidence of trichina infection is seldom encountered in this country. Most hogs that come to slaughter in our abattoirs are well under one year old. Since very heavy infections with trichinae in hogs in this country are the exception rather than the rule, as far as

available evidence shows, the white, gritty spots that led to the discovery in Philadelphia of trichinae in pork in 1846 are, indeed, a rare find in hogs in the United States at the present time.

Following the discoveries made in Germany in 1860 regarding the mode of transmission of trichinae through the consumption of raw pork and the demonstration, at about the same time, that these parasites are injurious to human health, the medical profession and, in fact, the general population of that country became trichina conscious and alarmed over the possibility of acquiring from pork a serious and sometimes fatal disease. Since the people of northern Germany commonly ate raw pork, it became evident to the sanitary authorities of that country that serious consequences were apt to follow the indulgence in this habit.

Microscopic Inspection of Pork.—On the heels of the discoveries concerning trichinosis, serious outbreaks of this disease in small towns in Germany actually came to light. As a result of these and other outbreaks of trichinosis, the German government instituted a system of microscopic inspection of pork which, as far as is known, has survived until the present time, and has been imitated by other, but not all, countries on the European continent. The establishment of microscopic inspection in any country is a frank recognition by public health authorities that they have to reckon with a custom, deeply rooted in the general population, that regulates the cooking of pork by the palate rather than by the thermometer.

That the United States at one time had a microscopic inspection of pork for trichinae appears to be well known, owing to the numerous articles on trichinosis that have appeared in newspapers and magazines in recent years. What is not as well known, perhaps, is the fact that the microscopic

*From the Zoological Division, Bureau of Animal Industry, U. S. Department of Agriculture; reported at the first public hearing held by the New York State Trichinosis Commission, New York, N. Y., November 28, 1940.

inspection of pork for trichinae that was practiced in this country under federal meat inspection for a period of 15 years (1891 to 1906) did not apply to all hogs slaughtered in officially inspected establishments. Actually, it applied only to pork intended for export to certain countries in Europe which required this inspection. The admittance of pork from the United States to certain European countries was prohibited unless the shipments were accompanied by certificates setting forth the facts that the pork had been inspected microscopically and found free from trichinae. In short, the motives that lead to microscopic inspection of samples of pork from each hog designed for the export trade were economic rather than hygienic. This inspection did not apply at any time to the total hog slaughter that was subject to federal inspection.

Although trichina inspection with the microscope, as practiced in this country, was done in the accepted manner by microscopists who were under constant professional supervision, experience with this inspection was such as to warrant the belief that even when carried out conscientiously, such inspection does not and can not offer an absolute guarantee that any carcass passed as free from trichinae is really uninfected. According to statements published by German meat-inspection experts, samples of pork from this country certified as being free from trichinae were found in some cases to be infected after being reinspected at the destination. This is not surprising, considering the fact that only about three small samples, each about the size of an oat grain, were examined, in accordance with the usual custom, following their compression between glass slides. Since trichinae are not uniformly distributed throughout the muscles, it is quite possible to miss these parasites in particular samples that happen to be taken for examination. It must be admitted that this possibility diminishes in proportion to the intensity of the infection, the parasites in lightly or moderately infected carcasses being more apt to escape detection than those in carcasses that are

heavily infected. That the American system of microscopic inspection of pork was not inferior to that practiced elsewhere was shown as follows. An investigation conducted by the Bureau of Animal Industry of the U. S. Department of Agriculture in Germany showed that out of a total of over 6,000 cases of human trichinosis that occurred in that country in the latter part of the 19th century, about 33 per cent were caused by pork that had been examined microscopically by German inspectors and certified by them as being free from trichinae.

Aside from the inherent imperfection of microscopic inspection as a prophylaxis against trichinosis, other objections, equally serious, have been marshalled against this scheme of prevention. It is reasonable to assume that knowledge of the existence of microscopic inspection would tend to encourage the consumption of raw pork and thereby undo much of the good that the inspection might accomplish by eliminating from the channels of trade carcasses showing marked infection. This knowledge would tend to create in the minds of persons who are fond of raw pork a false sense of security and thereby defeat in a measure the very purpose for which the inspection was intended.

Another and, perhaps, more serious objection to microscopic inspection in this country arises from the following circumstances. Federal inspection of food animals in the United States is limited to plants that engage in interstate and/or foreign commerce. Plants not engaging in such enterprises do not come under the provisions of the meat-inspection act of Congress and are subject only to state or municipal inspection, or are entirely without inspection. Moreover, slaughter done on the farm is exempt from federal and all other inspection. Since few states and not a great many municipalities have a rigid system of meat inspection, it can not be supposed that all swine carcasses slaughtered in this country would be subjected to microscopic inspection even though such inspection were maintained by the federal government. Very few consumers would

take the trouble to differentiate between pork inspected microscopically under government or equally competent supervision and pork not so inspected. The confusion that would result from this state of affairs would nullify, at least in part, much of the good that would result from microscopic inspection.

Aside from the objections already cited, there still remains to be considered the rather serious question of the cost of microscopic inspection. Approximately 40 million hogs are slaughtered under federal inspection annually, this representing about 60 per cent of the total hog slaughter in the country as a whole. It is safe to state that the cost of microscopic inspection would average about 25 cents per hog, so that the annual cost of inspecting for trichinae under government supervision would amount to about \$10,000,000. Considering the fact that this sum is almost twice that of the present total cost of all federal meat inspection, the drain on the public treasury for an inspection which, at best, is only partially effective would hardly appear to be warranted.

PROCESSING OF COOKED PORK PRODUCTS UNDER FEDERAL INSPECTION

In the absence of any known practical inspection to determine whether or not the muscle tissue of pork contains trichinae, no guarantee of any kind as regards the freedom from these parasites can be given in the case of fresh pork in all forms. This includes not only the various cuts of fresh pork, but also fresh sausage containing pork muscle tissue, and such cured or smoked pork as ordinary hams, shoulders, shoulder picnics, bacon and jowls, all of which are considered as articles which are or should be well cooked in the home and elsewhere. Under federal meat inspection, all products containing pork muscle tissue to be sold as cooked products or as cured products that are fit for consumption without cooking, are treated by methods which are known to be destructive to the vitality of trichinae. In this category are included bologna-style sausage; frankfurt-style sausage; vienna-style sausage; smoked pork sausage; chopped, cured meat rolls; all

forms of summer or dry sausage; cured, boneless pork loin; fresh, boneless loin in casings; boneless, back bacon; roast, baked, cooked or boiled ham, shoulder or shoulder picnic; Italian-style ham; and other products commonly intended for consumption without cooking.

The methods of treatment for these special products include (1) heating, (2) special refrigeration, and (3) special processing, these procedures having been found by extensive, painstaking, scientific investigations to be deleterious to the vitality of trichinae. Under the prescribed heating it is required that all meat-food products of kinds mentioned must be so heated that they will attain in all parts a temperature of not less than 137° F. Under the required refrigeration, pork and articles containing pork muscle tissue are subjected to a temperature of not higher than 5° F. for a continuous period of not less than 20 days, or are subjected to lower temperatures for shorter specified periods. The special curing methods, prescribed in lieu of the required heating or refrigeration, are designed to effect the destruction of trichinae by the continuous action of curing ingredients, more particularly salt, at specified temperatures for definite periods. These curing methods, which are based on empirical formulae, are known, as a result of numerous trials, to be effective in destroying the vitality of trichinae.

All the methods approved by the federal Bureau of Animal Industry as effective in destroying life in trichinae are based upon scientific research carried out by qualified investigators in the laboratory and under conditions prevailing in meat-packing establishments operating under federal inspection. The methods now recognized as effective were subjected to repeated trials and the treated products were tested in each case for live trichinae.

In the case of treatment by heat, trichinous pork was subjected to the specified temperature, thermometers being inserted in various cuts to make certain that the desired but not a higher temperature was actually attained. In the case of pork subjected to special refrigeration for prolonged periods, self-recording thermom-

eters were used to ascertain the temperatures of the refrigerators, and thermocouples were inserted in the center of trichinous meat to determine the killing temperatures for trichinae. In the case of products subjected to curing, the curing ingredients used, as well as the temperatures in the curing rooms, smoke houses and drying rooms, were carefully checked and the products were under constant supervision by the investigators engaged in carrying out the details of the tests. All pork used in these investigations came from hogs experimentally infected with large numbers of trichinae and actually found to be infected by postmortem examination. All products tested were fed to white rats, these animals being kept for 30 days, unless they died earlier, and examined for trichinae *post mortem*. Even the slightest infection in rats that were fed on products that had been heated, refrigerated or cured was considered as evidence that the method used was unsatisfactory. All procedures that yielded live trichinae were discarded. Rats in which no trichinae could be found by microscopic examination of the diaphragm were skinned, eviscerated and ground up so that the entire body musculature could be digested and the sediment examined for trichinae. Only those procedures that yielded consistently negative results, after repeated trials, were approved for use in meat-packing establishments operating under federal inspection.

FEDERAL INSPECTION OF MEAT-FOOD PRODUCTS SAFEGUARDS PUBLIC AGAINST TRICHINOSIS

The procedures now in use by federally inspected establishments are under the scrutiny of inspectors. From time to time samples of the products in question are collected without prior notice, and subjected to laboratory examination to determine whether or not they contain viable trichinae. Although upward of 10,000 samples have been examined during the past few years in the laboratories of the Bureau of Animal Industry, none was found to be infected with trichinae capable

of developing in susceptible animals. On the other hand, in an examination of 1,000 samples of products not especially processed to destroy trichinae, live parasites were found in 45. It is quite evident, therefore, that under federal meat inspection the public is safeguarded against the danger of trichinosis from products that are normally eaten without cooking. In other words, the meat-food products containing pork muscle tissue that are customarily eaten without cooking and would, therefore, be the most fertile source of human infection, are rendered safe for consumption by a vigilant meat-inspection service. Products of this class not prepared under federal or equally rigid inspection should always be well cooked.

In short, the federal meat-inspection service does not altogether leave the consumer to his own devices in protecting himself from trichinosis. Although it does not underwrite fresh pork and ordinary varieties of cured pork as being free from trichinae, and does, in fact, issue repeated warnings as regards the danger that might follow from the consumption of such pork without adequate cooking, it affords a full measure of protection to the consumer of pork products that are intentionally designed to be eaten without cooking.

It is not generally known that the Food and Drug Administration prohibits the use of corn sugar in the canning of foods. Only cane and beet sugar are recognized as sweeteners. Says the *Prairie Farmer*, "It seems that the Secretary of Agriculture is discriminating against the use of corn."

Since the Holstein herd-improvement test came into operation twelve years ago, the annual yield for 10,371 cows was raised to 405.2 lb. of butter fat and an average of 11,700 lb. of 3.46 per cent milk per head. The previous record was 346 lb. of butter-fat per cow. Cows milked three times a day averaged 70 lb. more butter fat annually than those milked but twice a day.

The Treatment of Sheep Parasites with Repeated Doses of Phenothiazine*

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DURING the past three years many studies have been conducted on the use of phenothiazine in the treatment of animal parasites. Many workers have emphasized that a single treatment with this drug is sufficient to reduce the number of parasites to a point where they are no longer injurious to the health of the animal. Other workers, however, have used the drug in repeated doses, over a short period, as their method of treatment. It is the purpose of this paper to show the effect of repeated treatment over a period of four months in an effort to correct acute parasitism in sheep.

REVIEW OF LITERATURE

Singer and Baker¹ have shown by their experiments that the drug is particularly effective for the removal of *Oesophagostomum columbianum*, *Ostertagia ostertagi*, and *Cooperia curticei*, less effective against *Nematodirus filicollis* and *Haemonchus contortus*, and ineffective against *Trichostrongylus*, *Strongyloides* spp. and *Trichuris ovis*. In the work of Habermann and Harwood² there was shown that in doses of 20 Gm. nodular worms could be effectively removed. Harwood, Habermann and Jerstad³ have indicated that commercial phenothiazine at a dose rate of 0.25 Gm. per pound of body weight was much less effective than when given at a dose rate of 0.5 Gm. per pound of body weight. In the treatment of cattle, Swanson, Porter and Connelly⁴ used

50 to 80 Gm. per animal as a single treatment, while Swanson, Harwood and Connelly⁵ in the treatment of swine used 0.25 to 0.9 Gm. per pound of body weight.

In experiments to compare the efficacy of crude unconditioned phenothiazine with recrystallized phenothiazine, Habermann *et al*⁶ used 25 Gm. in the treatment of sheep and found it to be quite effective. Roberts⁷ and Gordon⁸ treated sheep with doses of phenothiazine varying from 0.15 Gm. per pound of body weight to 0.6 Gm. per kilogram (2.2 lb.) in conjunction with preliminary treatments of 5 per cent and 10 per cent copper sulfate; also Gordon⁹ showed in treating for *Trichostrongylus* spp. in sheep that a dose of 0.6 Gm. per kilogram of body weight was efficient, whereas a reduced dosage was less effective in proportion to the rate of reduction. Taylor¹⁰ stated that a dose of 10 Gm. was found to be adequate for sheep, although doses of 20 to 30 Gm. were more likely to produce a maximum effect. He also stated that sheep will tolerate 400 Gm., but that small repeated doses proved toxic.

It is the purpose of this paper to show which of the two methods of treatment, single and repeated, and which of the two dosages, 25 Gm. per treatment and 0.3 Gm. per pound of body weight, are the most effective for the removal of common parasites from the intestinal tract of sheep.*

*The phenothiazine, or thiodiphenylamine (C₁₂H₉NH.C₆H₄.S), was obtained for experimental investigation from the E. I. du Pont de Nemours Company of Wilmington, Del., and indicated as "phenothiazine without wetting agent."

⁵Swanson, L. E., Harwood, P. D., and Connelly, J. W.: Phenothiazine as an anthelmintic for the removal of intestinal worms from swine. J.A.V.M.A., xvi (March 1940), pp. 333-338.

⁶Habermann, R. T., Harwood, P. D., and Hunt, W. H.: The efficacy of crude unconditioned phenothiazine for the removal of gastrointestinal parasites from sheep. Proc. Helminth. Soc. Wash., vii (1940), pp. 16-18.

⁷Roberts, F. H. S.: The value of phenothiazine in the treatment of oesophagostomiasis in sheep. Australian Vet. J., xv (1939), pp. 237-244.

⁸Gordon, H. McL.: The anthelmintic efficiency of phenothiazine. Abst., Vet. Bul., x (Nov. 1940), pp. 877-878.

⁹*Ibid.*: A preliminary note on the anthelmintic efficiency of phenothiazine against *Trichostrongylus* spp. in sheep. J. Coun. Sci. & Ind. Res. (Australia), xii (1939), pp. 345-347.

¹⁰Taylor, E. L.: Small doses of phenothiazine effective. Vet. Med., xxxv (Nov. 1940), pp. 616-617.

*From the Department of Bacteriology and Hygiene, University of Delaware; a Haskell Animal Disease Research project.

¹Singer, A. J., and Baker, D. W.: Phenothiazine as an anthelmintic for intestinal nematode parasitism in sheep. Cornell Vet., xxx (July, 1940), p. 375.

²Habermann, R. T., and Harwood, P. D.: Efficacy of recrystallized phenothiazine for the removal of nematodes from the gastrointestinal tract of sheep. Vet. Med., xxxv (1940), pp. 24-29.

³Harwood, P. D., Habermann, R. T., and Jerstad, A. C.: Efficacy of commercial phenothiazine in the removal of roundworms from sheep. Vet. Med., xxxiv (1939), pp. 440-443.

⁴Swanson, L. E., Porter, D. A., and Connelly, J. W.: Efficacy of nonconditioned phenothiazine in removing worms from the alimentary canal of cattle. J.A.V.M.A., xvi (June 1940), pp. 704-707.

TABLE I—Results of Postmortem Examination of Intestinal Tracts of Sheep on Phenothiazine Treatment

	No.	OESOPHAGOSTOMUM COLUMBIANUM		BUNOSTOMUM TRIGONOCEPHALUM		NEMATODIRUS SPF.		HAEMONCHUS CONTORTUS		CHABERTIA OVINA		TOTAL
		♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	
GROUP I: CONTROL												
No phenothiazine	1	4	4	6	17	6	11	4	36	0	1	89
	2	6	19	3	7	10	14	13	24	1	4	101
	3	8	24	1	8	4	18	8	76	0	2	149
	4	0	3	4	11	9	9	0	6	0	4	46
GROUP II: 25 GM. PER TREATMENT												
Single treatment	1	5	9	4	10	10	11	9	14	1	7	80
	2	8	16	0	8	6	13	0	4	3	5	63
Repeated treatment	3	1	4	0	4	1	7	1	1	1	1	21
	4	0	2	0	1	3	6	0	0	0	0	12
GROUP III: 0.3 GM. PER POUND BODY WEIGHT												
Single treatment	1	1	3	4	14	2	12	6	11	6	8	67
	2	1	9	3	4	6	10	0	4	0	0	37
Repeated treatment	3	Animal taken off experiment. Not slaughtered										
	4	1	6	0	1	1	11	0	7	1	3	31

PROCEDURE

The flock from which the experimental animals were obtained consisted of 100 Hampshire ewes of all ages that had been pastured in the same field for several years.

Several ewes of this flock died and a diagnosis of acute parasitism was made. On postmortem examination these animals were found to be heavily infested with stomach worms, nodular worms and hookworms. From this flock twelve yearling ewes were selected for the experiment. These ewes were divided into three groups of four ewes each. Group I is indicated as the control group, group II received a standard amount (25 Gm.) of phenothiazine per treatment, while group III received the drug on the basis of 0.3 Gm. per pound of body weight.

Animals 1 and 2 of groups II and III received one treatment at the beginning of the experiment, while animals 3 and 4 of groups II and III were treated every two weeks from May 10, 1940, until September 17, 1940. Therefore, those animals on repeated dosage received twelve treatments over a period of four months. The phenothiazine was administered by means of gelatin capsules and a balling gun. Fecal samples were taken weekly for examination for several weeks in order to determine the degree of infestation. The animals used in this experiment were never fasted, and feed and water were allowed at all times. These animals

were placed on clean pasture, and rotation of pasture lots was made at monthly intervals. At the end of the experimental period, the animals were slaughtered and complete parasitic examination of the intestinal tract was made.

EXPERIMENTAL DATA

The examination of the viscera indicated that the following parasites were of greatest importance: nodular worm, *O. columbianum*; hookworm, *Bunostomum trigonocephalum*; Nematodirus spp.; stomach worm, *H. contortus*; and large-mouth bowel worm, *Chabertia ovina*. Tapeworms (*Moniezia expansa*) were found in three of the test animals, while whipworms (*T. ovis*) were present in the ceca of all animals in insignificant numbers.

In table I, the postmortem examination results have been tabulated. In the control group (group I), animals 2 and 3 show the highest degree of infestation, with 101 and 149 parasites, respectively. Animals 1 and 4 of the control group contained 89 and 46 parasites, respectively. When group II is considered as a unit, the examination shows that those animals which received

TABLE II—Weights and Percentage Gains of Sheep on Single and Repeated Treatments with Phenothiazine

	No.	Lb. Wt. Before Treatment	Lb. Wt. After Treatment	Per Cent Gain	
GROUP I: CONTROL					
No phenothiazine	1	130	130	0	6.9 = average % gain
	2	106	109	2.7	
	3	95	108	13.6	
	4	106	118	11.3	
GROUP II: 25 Gm. PER TREATMENT					
Single treatment	1	120	126	5.0	16.7 = average % gain
	2	113	119	5.3	
Repeated treatment	3	79	101	21.7	
	4	86	116	34.8	
GROUP III: 0.3 Gm. PER POUND BODY WEIGHT					
Single treatment	1	54	74	37.0	23.3 = average % gain
	2	80	85	6.2	
Repeated treatment	3	77	Animal taken off treatment		
	4	97	123	26.8	

Average percentage of weight gain from single treatment = 5.8.

Average percentage of weight gain from repeated treatment = 27.7.

a single treatment of 25 Gm. (Nos. 1 and 2) have a higher incidence of infestation than those receiving repeated treatment with the same amount of phenothiazine. The two animals on single treatment had 80 and 63 parasites, while the two animals on repeated treatment had 21 and 12 parasites, respectively. These numbers indicate all species except tapeworms and whipworms. In group III, animal 3 was dropped from the group as the fecal examination indicated that the incidence of infestation was much less than the other animals on test. However, when the remaining three animals are considered as a unit, the two animals on single treatment showed 67 and 37 parasites, respectively, and the one animal on repeated treatment had 31 parasites.

Any generalizations made upon the results (table I) would show that the treatment with phenothiazine was quite effective against *O. columbianum*, *B. trigonocephalum*, and *H. contortus*, less effective against *C. ovina*, and ineffective against

Nematodirus spp. However, the degree of infestation of all animals, including the controls, was low for *C. ovina*.

A comparison of results from single and repeated treatments shows that in group II, where 25 Gm. of phenothiazine was used, the repeated treatment was quite effective. The parasite counts of those receiving repeated treatment indicated that the males and females of all species were greatly reduced below the numbers in those receiving a single treatment, except in the case of *Nematodirus* spp., where the counts were slightly lower, but not in the same proportion as in other species.

In group III, the repeated treatment was more effective than single treatment, except that the parasite count was not reduced to the same degree as in group II. However, a comparison of animals 2 and 4 of this group shows the counts of all species to be essentially alike. Therefore, the mode of treatment, whether single or repeated, at the dosage rate of 0.3 Gm. per pound of body weight, is of little value for

the removal of the above-mentioned intestinal parasites.

Taylor¹⁰ stated that when phenothiazine was administered in repeated doses the animals showed toxic symptoms. This was not the case in this experiment. All animals in group II, receiving 25 Gm. per treatment, and in group III, receiving 0.3 Gm. per pound of body weight, failed to show any evidence of toxic symptoms when the drug was administered in repeated treatment and were able to tolerate the drug irrespective of dosage. It also has been stated that a single treatment is sufficient to reduce the number of parasites to a point where the parasites will no longer be injurious to the host. However, table II indicates that the percentage gains of those animals on repeated treatment far exceed those of the animals on single treatment, a fact which bears consideration when this drug is to be used as routine procedure.

In table II, the weights before and after treatment are indicated, as well as the percentage gains of all animals on single and repeated treatments with phenothiazine. Group I, the control group, showed an average percentage gain of 6.9 per cent for the group. Group II, receiving 25 Gm. per treatment, showed an average percentage gain of 16.7 per cent for the group. Group III, receiving 0.3 Gm. per pound of body weight, showed an average percentage gain of 23.3 per cent for the group. Animals 1 and 2 of groups II and III, which received a single treatment, showed an average percentage gain of 5.8, while animals 3 and 4 of group II and animal 4 of group III, which received repeated treatments, showed an average percentage gain of 27.7.

DISCUSSION AND SUMMARY

A comparison of results, as shown in table I, indicates that repeated treatments of phenothiazine are more effective for the removal of intestinal parasites of sheep than single treatments. The effectiveness of this method of treatment is questionable for the removal of *Nematodirus* spp. and the large-mouth bowel worm, *Chabertia ovina*; however, the nodular worm (*Oesophagostomum columbianum*), the hookworm (*Bunostomum trigonocephalum*), and the common stomach worm (*Haemonchus contortus*) were very effectively reduced in number.

There is also shown in table I that while a dosage of phenothiazine of 0.3 Gm. per pound of body weight will remove the above-mentioned parasites, the animals tolerate the repeated dosage of 25 Gm. per treatment and the parasites are more effectively removed by the latter dosage.

The results as indicated in table II of the weights and percentage gains of sheep on single and repeated treatments of phenothiazine show that gains made by the animals on repeated treatments far exceeded those on single treatment. The control group (group I) shows an average percentage gain of 6.9 as compared with 16.7 for group II, and 23.3 for group III. Those animals which received the single treatment showed an average percentage gain of 5.8 as compared with an average percentage gain of 27.7 for those animals on repeated treatment.

In summarizing this work, it can be said that a dosage of 25 Gm. of phenothiazine administered at two-week intervals can be tolerated and will effectively remove the intestinal parasites common to sheep. The gains in weight of the animals receiving repeated doses of phenothiazine have been found to exceed those on single treatment.

Chicks at Community Sales

A bill has been introduced in the Illinois legislature to regulate the sale of baby chicks at any auction, auction sales barn, or community sale. The bill provides for the proper labeling of the box, crate or coop containing chicks sold at such markets. The aim is to prevent hatcheries from disposing of chicks of inferior quality, perhaps stricken with disease, at these marts which, needless to remind veterinarians, can sink to a low sanitary level unless operated under sensible regulations.

Sixty well-known and useful products are made from the grain of corn, 58 from the cob and 21 from the stalks. There is no comparable substance, except coal.

A Practical Dilution-Egg-Count Procedure*

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IN THE LIGHT of recent investigations into the pathology, immunology and chemotherapy of enterohelminthic infections, it has become definitely unsound practice to indiscriminately treat all animals infected with worms, except as a public health or sanitary measure. Anthelmintic therapy of light infections in pregnant animals to prevent infecting the young and in pets to prevent infecting child playmates still is, of course, advisable. But, as Stoll¹ has suggested, a light enterohelminth infection may be of actual service to an animal in that it keeps its immunity to the concerned parasite in an active form. It is, therefore, desirable for the veterinarian to have available a method of determining the level of the worm burden that an animal is carrying.

While working with human hookworm disease, Stoll² developed a dilution-egg-count technic which has been of inestimable benefit in survey and control work with this disease. More recently Stoll³ has modified the technic to adapt it to sheep. Unfortunately, this technic requires considerable experience and is time consuming; hence, it is not well adapted for use by the busy practitioner.

Recently Gordon and Whitlock⁴ reported a modification of the Stoll dilution-count technic which seemed to offer definite practical advantages. However, one of their essential pieces of equipment is a calibrated glass chamber. While this has defi-

nite theoretical advantages, rendering the dilution egg count fundamentally similar to the standard blood-counting technic, it is impractical because the manufacture of an accurately calibrated glass chamber is prohibitively expensive. Gordon and Whitlock's technic also requires a 2-Gm. fecal sample. The possibility of error in weighing such a sample with the type of balances available to the general practitioner is too great. In addition, it is felt that such a small sample of the great fecal mass produced by the domestic herbivores is subject to a needlessly large sampling error. For these reasons Gordon and Whitlock's original technic has been modified as follows:

MATERIALS

The following materials and equipment (fig. 1) are needed for the examination:

1) Several one-half pint milk bottles which have been marked with a file to indicate 150-cc. capacity.

2) One or more graduated 1-cc. tuberculin syringes.

3) Saturated sugar or saline solution.

Formulae:

Sugar solution (Benbrook⁵)

Granulated sugar, 1 lb.

Water, 12 oz.

Dissolve the sugar in the water by immersing the bottle in hot water. Add 1 per cent phenol as a preservative.

Salt solution (Rebrassier⁶)

One part salt to three parts water.

4) Small balance.

5) Microscope with mechanical stage.

6) Small tea strainer.

7) Several small beakers.

8) Special glass slide made as follows: An ordinary glass slide is broken into several small pieces. Two of these are glued by means of balsam to the ends of an ordinary glass slide. Another glass slide is attached to these supports and the glass chamber thus formed is put aside until the balsam has set. It is more convenient if the two slides are not parallel but are offset. (See figure 2.) This chamber is

*Benbrook, E. A.: Fecal examination for evidence of parasitism in domestic animals. *Vet. Prac. Bul.*, Iowa State Col., xxvii (1929), pp. 1-56.

⁶Rebrassier, R. E.: *Diagnosis of Animal Parasites* (Ohio State Univ. Press, 1938), 65 pp.

*From the Division of Veterinary Medicine, Kansas State College; contribution No. 86, Department of Veterinary Medicine.

¹Stoll, N. R.: Worm-host systems as labile mechanisms: a view of the nematode-ruminant problem. *J.A.V.M.A.*, xvi (March 1940), pp. 305-309.

²*Ibid.*: Investigations on the control of hookworm disease. XV. An effective method for counting hookworm ova in human feces. *Amer. J. Hyg.*, lli (1923), pp. 59-70.

³*Ibid.*: On methods of counting nematode ova in sheep dung. *J. Parasitol.*, xxli (1930), pp. 116-136.

⁴Gordon, H. McL., and Whitlock, H. V.: A new technic for counting nematode eggs in sheep feces. *Australian Coun. Sci. & Ind. Res. J.*, xli (1939), pp. 50-52.



Fig. 1. Materials and equipment used in the examination.

easily and safely washed in cool running tap water.

TECHNIC

1) Ten Gm. of feces are weighed. (If a smaller sample is all that is available, the technic may still be used but correspondingly less water should be added.)

2) The fecal sample is broken into small pieces and a thick fecal suspension is made.

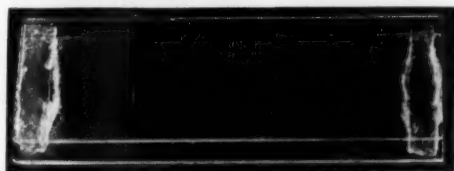


Fig. 2. Special glass slide.

Soft feces may be easily mixed directly with water to form a thick puree. Hard fecal matter, such as sheep pellets, must be soaked or ground up before making this thick suspension. Wooden tongue depressors are convenient implements for handling fecal matter.

3) Water is added up to the 150-cc. mark on the milk bottle and the thin suspension thus formed is vigorously stirred.

4) Approximately 10 cc. of the fecal suspension is poured into a small beaker through the tea strainer.

5) Exactly 0.5 cc. of this strained suspension is drawn into a graduated tuberculin syringe. (This does not mean that the syringe is filled to the 0.5-cc. mark, because the needle

holder also fills with fluid. Most tuberculin syringes are filled with exactly 0.5 cc. if the fluid is drawn up to the 0.49-cc. mark, but this should be checked for each syringe used.

6) Exactly 0.5 cc. of a saturated sugar or saline solution is drawn into the tuberculin syringe.

7) An air bubble is drawn into the syringe. (See figure 3.) This air bubble should be of such diameter as to move rapidly up and down the syringe barrel when it is tilted, but large enough to agitate considerably the contents of the syringe in its passage.

8) By tilting the syringe up and down, the fecal suspension therein is thoroughly mixed (fig. 4).

9) After expelling approximately 0.2 cc. from the syringe as waste, three 0.15-cc. samples are expelled from the syringe into the special glass slide (fig. 5). The material in



Fig. 3. An air bubble is drawn into the syringe.

the syringe should be kept thoroughly mixed when taking these samples by tilting it up and down and rolling it, following the expulsion of each sample.

10) The special glass chamber is then placed in position on the mechanical stage of the microscope and allowed to remain unagitated for at least one minute.

During this period the high specific gravity of the solution will cause the helminth eggs to



Fig. 4. By tilting the syringe up and down, the fecal suspension is thoroughly mixed.

rise to the surface of the sample while most of the fecal matter remains on the bottom. The eggs are thus concentrated in a small area which is comparatively free of fecal matter.

11) The upper surface of each of the three samples is systematically scanned and the numbers of eggs for each sample recorded. The average number of eggs per sample is determined and this average multiplied by 200 gives the number of eggs per gram of feces. For example: A sheep suspected of having a strongyline infection was brought to us for examination and diagnosis. The count of strongyline eggs ran 95, 58, and 62, on three successive samples. The average count per sample was thus determined as follows:

$$\frac{95 + 58 + 62}{3} = 71.6$$

The average count per sample was multiplied by 200 to give the eggs per gram of feces. ($71.6 \times 200 = 14,320$ E.P.G.) The lamb was definitely anemic, skinny and bottle-jawed and the egg count was dangerously high; hence, a diagnosis of parasitic gastroenteritis was made. He was treated, and two days later the sample egg count ran 5, 7, 4.

Average count per sample:

$$\frac{16}{3} = 5.3$$

Eggs per gram of feces: $5.3 \times 200 = 1,060$ E.P.G.

The second count did not indicate a dangerous infection, and it was predicted that the animal had been effectively treated. This prog-

nosis was justified because the animal began to improve in flesh and condition and within two weeks there was no sign of the disease.

In determining the average count, apparently aberrant sample counts should not be eliminated if one is certain of his technic. They should be averaged with the others. As a routine policy a count of three 0.15-cc. samples is recommended, although, of course, any number may be made. However, the special slides hold three samples easily and, since the counting is rapid, the extra knowledge from the several samples is worth the little extra time involved.

DISCUSSION

The materials and equipment used in this technic are comparatively inexpensive and reasonable care and alertness are the only prerequisites to its successful use. Several veterinary students of different degrees of experience have used this or a similar technic and obtained results which varied surprisingly little from the expected.

The dilution egg count in human hookworm infections makes possible the prediction with a small amount of error the numbers of worms parasitizing an individual. The same sort of accuracy should obtain with nematode infections in carnivores,



Fig. 5. After expelling approximately 0.2 cc. of the suspension from the syringe as waste, three 0.15-cc. samples are expelled into the special glass slide.

because one is dealing with a host which has a fairly limited fecal output. In addition, the etiologic agents of carnivore nematode infections can usually be specifically diagnosed and counted separately on a fecal examination. However, the domestic herbivores may be infected with as many as 45 different species of nemas whose eggs are so similar as to defy differentiation yet whose rate of egg production will vary. This in conjunction with

the enormous fecal output by herbivores as well as numerous other sources of error tend to make sampling inaccurate.

However, the modified Stoll egg count should be valuable to the veterinary practitioner because it enables him to differentiate between light, moderate and heavy enterohelminth infections in all animals, making it possible for him to treat only those cases which need it, check quantitatively on the efficacy of his anthelmintic therapy and check quantitatively on the efficacy of control measures.

Although several workers have indicated the E.P.G. level which they consider to be dangerous, the suggestion of Taylor⁷ may be considered as typical:

E.P.G.

Parasitic gastritis in lambs....	2,000-6,000
Parasitic gastritis in cattle....	300- 600
Equine strongylosis	1,500-2,500
Ovine fascioliasis	300- 600
Bovine fascioliasis	10- 200

No information is available regarding the dangerous levels in other important parasitic diseases. It is suggested, therefore, that an important contribution to veterinary literature could be made by the practitioner determining the E.P.G. level at which clinical symptoms of canine ascariasis, ancylostomiasis, etc., appear.

Used with judgment and knowledge of its limitations this easy technic should become an invaluable aid to veterinary diagnosis.

SUMMARY AND CONCLUSIONS

A modification of the original Stoll egg count is described which seems to eliminate many of the undesirable features of the original. The advantages of this technic are: The eggs are concentrated in a fairly small area, they are separated from most of the fecal debris, and are easily and rapidly counted by even comparatively inexperienced workers.

The use of this count is advocated as a practical aid to diagnosis and as a check on the efficacy of anthelmintics.

⁷Taylor, E. L.: The diagnosis of helminthiasis by means of egg counts, with special reference to redworm disease in horses. *Vet. Rec.*, 11 (1939), pp. 895-898.

Tractors Impoverish Farmers

The man who uses horses or mules, or both—good animals, wisely managed—gets his farm work done on time and saves the \$300 to \$600 a year he would pay out for tractor depreciation, repairs, gas and oil. He may put in somewhat more time nights and mornings, and a few more days in getting his field work done, but it is well done, and he is saving money.

Carl C. Taylor, head of the Division of Farm Population and Rural Welfare, U. S. Department of Agriculture, testifying before a committee of Congress April 23, 1940, pointed out that the increase in mechanized farming since 1910 had brought about:

a) an increase in out-of-pocket and fixed costs of farm operations, and an increase in economic risks involved in farming, due to expenses incurred in the purchase and operation of machinery and interest charges on debts and tax services;

b) an increase, over several decades, in farm-mortgage debt in relation to farm values, resulting in a decreasing percentage of farm real estate equities owned by those who till the soil;

c) an increasingly larger share of farm income now spent for farm implements and machinery and for their operation, which contributes to the rigidity of the farm operating cost structure and the disparity of farm income and parity income, and increases the competition between operating costs and the farm family standard of living;

d) a sizable shift in the ownership of farms from farmers to centralized lending agencies in satisfaction of debts, and an increase in farm-mortgage debt held by the centralized lending agencies.

Boiled down into simple language, this means that the financial situation of most farmers has grown worse as mechanized farming has increased. [*Excerpt from "An Open Letter to the Ford Motor Company," by Wayne Dinsmore, secretary of the Horse and Mule Association of America.*]

Small Animal Dentistry*

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THE PURPOSE of this paper is to bring under one heading some of the accepted practices in canine dentistry.

Dentistry is an important part of small animal practice. A study of 10,000 case records showed that 12.76 per cent of the patients treated in my hospital required some dental work. As the public has become tooth-conscious through the publicity given to human dentistry, clients are easily educated as to the importance of dentistry in dogs. When told that their dog should have its teeth attended to, most owners agree and are willing to have a regular check-up as often as we desire.

Dentistry is pleasant to practice, and seldom a matter of life and death. Veterinarians and owners of dogs who have seen the improvement in health following the extraction of decayed teeth and the treatment of gum infections agree that this branch of practice is significant. Digestive disorders, keratitis, rheumatism, obscure lameness and kidney infections may be caused by diseased teeth or gums.

Compared with the human denture, that of the carnivores is entirely different in the number and kind of its units. The dental formula of a dog is:

$$\begin{array}{l} \text{Maxillary—} \\ \quad \quad \quad 2 \\ \text{Mandibular—} \end{array} \left(\begin{array}{cccc} 3 & 1 & 4 & 2 \\ 1 & - & C & - & P & - & M \\ 3 & 1 & 4 & 3 \end{array} \right) = 42$$

The dog, therefore, has ten more teeth than the human being. The mandibular or lower incisors fit closely behind the maxillary or upper ones in such a way that the dog's bite is a scissor action. The opposing molars do not meet one another for grinding food. The dog's food is bolted, not masticated. The food is torn and cut into chunks small enough to be swallowed and is slowly digested in the stomach. A dog may lose all of its teeth and still live for

years. Owners who do not know the functions of the dog's teeth are loath to have them extracted until these facts are explained. In man, digestion starts in the mouth. Mastication is one of the reasons why a man's food is digested in 1½ to 3 hours whereas the same meal would not digest in a dog's stomach for 10 to 16 hours.

It is true that nature did not intend the dog to chew its food, although the large carnassial teeth do cut bone and the molars crush bones into particles small enough to swallow. But the bone can as well be supplied in the form of bone meal to furnish the calcium and phosphorus dogs require.

RESTRAINT AND ANESTHESIA

A considerable amount of simple dental work can be done on tractable dogs standing upon the examination table, if the top is slippery. On such a table with an assistant at the head, an experienced operator can scrape off tartar or extract loose simple teeth. The dog's eye should be protected against injury from swinging the head downward. Unanesthetized dogs resent the mouth gag. Dogs difficult to control should be anesthetized. Healthy dogs not requiring extensive work are anesthetized with ether. Once the patient is profoundly anesthetized with ether, the period of relaxation lasts long enough for one to complete the operation before consciousness returns.

The 10 to 15 minutes of anesthesia induced with pentothal sodium is sufficient for ordinary extractions. The dose is ¼ to 1/5 grain per pound of body weight. For operations of longer duration, nembutal anesthesia is recommended. In removing a canine or a fourth maxillary premolar that must be split or its roots removed with the dental chisel or root elevator, nembutal is preferable. In poor anesthetic risks due to age, toxemia or debility, a sedative dose of nembutal to-

*Presented before the Section on Small Animals at the 77th annual meeting of the AVMA, Washington, D. C., August 26-30, 1940.

gether with a local anesthetic injected over the mandibular or maxillary nerves, described by Lacroix,¹ has been successful. Morphine and atropine are given subcutaneously an hour before operating. Atropine lessens salivation and equalizes the action of the morphine and nembutal. Nembutal is given intravenously in small dosage that relaxes but does not completely anesthetize the patient. A 2 per cent solution of procaine is used with a Luer syringe and a 1-inch, 22-gauge needle.

For the maxillary teeth the needle penetrates just behind the last molar parallel to its long axis. The solution is injected slowly as the needle penetrates. The distance of penetration depends upon the dog's size. In large dogs the distance is about one inch. The dose injected is from 1 to 4 cc. for each of the four jaws.

For the mandibular teeth the needle penetrates behind the last molar, with the needle running almost parallel to the long axis of the jaw. In lean dogs the groove occupied by the mandibular nerve can be located by palpation. It is advisable to swab the mucous membrane with an antiseptic before making the penetration. Five minutes is allowed before beginning to operate.

EXTRACTING DECIDUOUS TEETH

When the deciduous teeth of pups do not shed in normal time they may block the eruption of their permanent successors. In this respect, Pomeranians and Chihuahuas are particularly troublesome. The pup's tusks should be extracted as soon as they are found to be blocking the eruption of the permanent ones. A root elevator is used to pry them loose before attempting to extract them with forceps. Otherwise, the crown may be broken off and leave the fang embedded. The broken fang of a deciduous tooth may be absorbed in the normal process of replacement, but in the meantime it may retard eruption of its permanent companion. Hence, whenever possible it is advisable to remove its broken root.

¹Lacroix, J. V.: A simple method of dental nerve blocking. No. Amer. Vet., xv (Jan. 1934), pp. 52-54.

FRAGILE AND PITTED TEETH

Fragile (soft) teeth or pitted teeth are caused by an attack of distemper or other exhausting disease that may impede structural development during the period of active dental evolution. Distemper disturbs the mineral balance, particularly of enamel, while the teeth are growing. Vitamin or mineral deficiencies may be the causal factors in this condition. I have never seen a dog suffering from a so-called distemper mouth contract distemper at a later date.

DENTAL CARIES*

Caries is comparatively rare. When present, the cavity appears on the table surface of molars, particularly on that of the fourth premolar. If the cavity is not too large, it may be cleaned out and filled with amalgam, but when extensive it would be preferable to extract the tooth, taking care that no root remains. The crown of such a tooth is but a shell that will break in the forceps.

REMOVAL OF TARTAR

Removing tartar is the most common dental work we do. There are many instruments employed for this purpose. I have found the small incisor forceps, known as S. 76, to be the best instrument. These little forceps crack the deposit easily. When used, the tartar scraper is needed only to remove remaining deposits.

Powdered pumice mixed with chalk and charcoal may be rubbed in with a swab to remove stains. The electrically driven burr used by dentists for this purpose does a better job and is more elegant.

EXTRACTIONS

The difficulties of extractions differ according to circumstances. As a rule, pyorrhea that extends into the alveolus loosens the fang of the single-rooted tooth to such an extent that it is easily extracted. There are, however, teeth that are so firmly adhered to their socket by an alveo-

*Since animals are said to be immune to dental caries, it would be interesting to receive specimens for investigation.—Ed.

lar periostitis as to necessitate the use of an elevator and molar splitter, or bone forceps. When force is needed to extract a tooth, it is wise to use counter force with the other hand to prevent fracture of the jaw. Fracture may occur at the level of the tooth or along the mandibular symphysis. To avoid criticism, this danger should be pointed out to the owner beforehand.

Incisors.—Being single-rooted, incisors are easily extracted. It is well, however, to rotate them before attempting to lift them out. The flat, lateral face of the incisors affords an excellent grip for the forceps, and they are usually loose or have wide enough interdentalia to permit placing the slender jaws of the forceps between them and the adjacent teeth. If broken, the root is easily removed with the root elevator by rocking and prying.

*Premolars.**—Having single roots, the first three premolars, like the incisors, are easily extracted. The second and third maxillary (upper) premolars and the second, third and fourth mandibular (lower) premolars, although double-rooted, are not difficult to extract. It is sometimes necessary to split these teeth vertically and take out each segment separately. If the crown fractures, it may be necessary to pry out the fang with an elevator.

Fourth Maxillary Premolar.—The fourth maxillary premolar has three roots—two anterior and one posterior. It is always wise to split this tooth vertically with the molar splitter as the width between the anterior and posterior roots *in situ* is greater than that of the alveolus at the level of the tooth's fang. The roots fracture when drawn into the narrow part of the alveolus. Splitting and then extracting each segment separately avoids that accident. If the segments are firmly attached to the alveolus, an elevator may be needed.

*The term "premolar" should not be confounded with "deciduous" in dental nomenclature (Dorland). For example, the first premolar molar of dogs, having no deciduous predecessor, is in fact the first molar, and the fourth premolar is in fact the second molar. The prefix "pre" appears to be used in clinical literature to avoid confusion.

First Mandibular Premolar.—The first lower molars, or carnassial teeth, except for the canine teeth, are the largest teeth of the dog. They possess two long roots embedded deep in the mandible. In extraction, this tooth is handled just as the fourth maxillary, or upper carnassial premolar, that is, it should be split vertically and each of the two segments removed separately.

The First Maxillary Premolar.—This tooth has a large crown and three short roots. It presents some difficulty in extraction because of the shape of its crown. It is hard to place the jaws of the forceps evenly on both buccal and lingual faces of the crown in such a way as to get a good grip. Placing the molar forceps on both sides to the best advantage and prying from side to side may loosen it. In some cases it is better to use the large incisor forceps and force them well into the neck of the tooth and then pry downward and outward to loosen the largest of the three roots, which are located medially. As the mucous membrane of the hard palate is firmly fused into the neck of the tooth, it may have to be snipped off with the scissors or scalpel to prevent tearing out a strip of it along with the tooth.

Second and Third Maxillary and Third Mandibular Premolars.—These are small teeth with short roots and somewhat rudimentary in character. They are not difficult to extract.

Canine or Tusks.—The fangs of these teeth are so long and so securely embedded that extracting them is a special problem of canine dentistry, unless already loose. If loose, the canine tooth to be extracted is grasped with the large incisor forceps placed well down over the neck and rotated to break down its attachments. When this is accomplished, the tooth comes out readily, but if so firmly attached that a reasonable amount of rotating and traction is not successful, the use of the root elevator may be necessary to pry it loose.

If this fails, the flap operation of Richman and Schunick² is resorted to. This

²Richman, S., and Schunick, W.: Flap operation for the removal of the canine tooth. No. Amer. Vet., xix (Dec. 1938), pp. 64-66.

operation consists of making an incision parallel to the edge of the fang and one across the level of the gums in the form of an inverted "L." The gum is loosened by blunt dissection with an elevator and the flap laid back along the whole length of the alveolus. The alveolar bone is removed with the dental chisel from the neck to the tip of the root. The tooth may then be loosened and lifted from its socket with an elevator. Removing rough projections with the curette or file and suturing the flap with silk completes the operation. Healing is surprisingly rapid.

This special operation is indicated particularly where a canine tooth has been accidentally fractured at the gingival margin. In that event, the tooth has healthy attachments. It does not have the loosened attachments associated with periodontal disease. It is next to impossible to remove the fang of such a canine otherwise or to relieve the pain of a canine tooth thus fractured.

Aftercare.—As there is always some danger from hemorrhage, shock and anesthesia, aftercare is important following the extraction of teeth. In older dogs, it is good practice to do such work at intervals of six weeks rather than to attempt to correct matters at one operation. It may be found necessary in major dental operations to give glucose and salines for a day or two as an after precaution. If hemorrhage persists after packing the alveolar cavities with gauze, intravenous hemostatics or blood transfusion should be promptly given. This is needed frequently in aged dogs.

Sometimes after a maxillary canine has been extracted, the alveolus may be found to communicate with the nasal fossa. This fistula is a nasty sequel that quite frequently follows the extraction of an upper canine in older dogs, especially when the tooth has been decayed for some time. The early extraction of canine teeth affected with pyorrhea is, therefore, advisable. I know of no cure for such a fistula. To avoid blame for causing such an unfortunate sequel, it is wise to draw attention to that prospect.

FISTULA OF THE FOURTH MAXILLARY PREMOLAR

This disease is caused by an abscess of the posterior root which points at the surface of the skull. In reality, it is a local necrosis of the alveolus at that site which is just below the eye. When examined at the crown, the tooth may not reveal the presence of disease, although calcareous deposits and pyorrhea may be present. In some instances, the tooth has been split by injury. Though veterinarians in general are now familiar with the nature of this chronic fistula, numerous cases are still treated as infected wounds by curetting or by antiseptic injections.

Treatment.—The only successful treatment is removing the tooth and establishing drainage by probing through with the root elevator. As stated above, it is usually necessary to split this tooth in two with a molar splitter and then remove the two segments separately with the molar forceps or root elevator.

Prognosis.—Prompt recovery may be expected in the majority of cases. Only extensive necrosis of the surrounding tissues prevents rapid healing. Careful curettage to remove diseased fragments and bony vegetations is indicated.

ROENTGENOGRAPHY

X-ray work has a definite place in canine dentistry, especially in cases that have been subjected to previous extractions. It is good practice to take plates to insure against the presence of retained roots. Normal roots are long and pointed, while infected ones are shortened and have blunt ends that do not occupy the entire alveolar cavity. Often the plates will show diseased roots that can not be otherwise detected. The fistula that does not heal after extraction of the fourth maxillary premolar may disclose the presence of necrosis or of an osteogenic sarcoma to account for the unhealed face.

DENTAL VITALITY TESTER

This instrument, commonly used by dentists, should be of equal value in small animal dentistry. In passing an electric

current through the tooth the animal will flinch if the tooth is normal, while devitalized teeth are not sensitive to even high voltage. It is, therefore, possible with this instrument to locate dead, infected teeth that appear normal. Needless to repeat, a diseased tooth may have a normal crown and yet be firmly embedded in its socket. Such teeth having infected roots may be the cause of focal infections.

PYORRHEA—PERIODONTAL DISEASE

The early stages of canine pyorrhea are manifested by deposits of calcareous material on the teeth at the level of the gingival margin. As the volume of the deposits increases, the disease extends to the fang. The gums become swollen and inflamed, and expose the fang by receding. The process invades the alveolar periosteum and causes the fang and roots to loosen. The breath is fetid.

The concretions of pyorrhea start on the buccal side of the upper cheek teeth, premolars, canines and incisors and, later, on the mandibular canines and incisors. The incidence is highest in aged dogs and is higher in the toy breeds, particularly in the Pomeranian and Pekingese. Most cases occur in dogs of 5 years or more, yet certain dogs have the disease as early as 2 years of age.

Cause.—Observations tend to indicate that a number of factors may be responsible for pyorrhea. Avitaminoses A and D during the growth period of life and throughout adult life have been regarded as causes. Some breeders have more of this trouble in their adult dogs than others raising the same breeds. Obviously, the diet is responsible for the difference. It occurs to me that changes in the pH of the mouth may account for the formation of tartar. Otherwise, why should these deposits form in some mouths and not in others? There is also the theory of specific infection. It is known that some dogs have the trouble only on one side of the mouth, others on the upper but not the lower teeth, and that once the disease is established, it tends to spread by contiguity to adjacent teeth.

Pyorrhea is also attributed to lack of use of the teeth due to feeding soft foods, whereas others claim that a properly balanced diet is more essential to the health of a dog's teeth than exercising the teeth by the feeding of bones. Since the dog is carnivorous and its dental apparatus is intended to bite and tear, rather than to masticate, the deficiency theory seems to be justified. Moreover, in adult dogs, case histories often show that they had suffered from distemper.

In fact, any debilitating disease tends to increase the incidence of dental trouble in dogs and conversely, since nephritis with uremia often coexists with periodontal disease, it is reasonable to contend that infections from diseased teeth may be far-reaching.

Treatment.—The treatment is scaling the tartar off the teeth, including that collected beneath the gums and on the interdental faces, both on the lingual and buccal sides. The loose teeth and those showing the infection in the alveoli are extracted. For large teeth firmly embedded, it is necessary to make heroic use of the elevator, molar splitter and chisel. Often, it is advisable to map out a program of successive treatments, taking out only a given number of teeth each month to avoid shock and serious hemorrhage. In some events it may be necessary to remove the entire denture to obtain a healthy condition of the mouth. Unlike herbivora, edentulous dogs will live in apparent good health through the normal span of life. When such a program is carried out, the improvement in general health is surprising. One can add years to the life of many dogs in this way if given the opportunity to attend to their teeth before it is too late.

VINCENT'S GINGIVITIS—TRENCH MOUTH —NECROTIC STOMATITIS

This is a relatively common disease of dogs and cats. It is characterized by the fetid odor emitted by the mouth. The lesions may not be as extensive as the odor seems to indicate. The odor is so pronounced that often one can suspect the presence of the disease before examining

the mouth. As the patients resent the oral examination, the disease appears to be painful.

This disease is sometimes associated with distemper. The gum margins are red and inflamed. Ulcers appear upon them to such an extent as to expose the necks of the teeth. Ulcers also appear on the mucous membrane of the cheek contacting the affected gums. Moreover, a cheilitis in the form of crater-like ulcers may appear on the skin of the lower jaw and commissures of the mouth. While more commonly associated with distemper, it also occurs in adult and aged dogs. It is claimed by some authorities to be transmissible to man. There is some evidence that the disease is contagious among dogs exposed to the sick. At least, when a case occurs in the distemper ward, it is liable to spread to other inmates.

On account and because of the brown stain that accumulates upon the buccal face of the teeth, necrotic stomatitis of this type has been named "contagious brown mouth."

Diagnosis.—The diagnosis is easily confirmed by staining a smear with gentian violet or by examining a smear under dark-field illumination for the presence of spirochetes. The spirochete is similar to *Treponema pallidum*, the specific organism of syphilis. Anaerobic bacteria are also found in great numbers. The long, rod-shaped organisms are easy to stain and to demonstrate on a slide.

Treatment.—Simple cases yield to cauterizing with silver nitrate and painting the areas with tincture of metaphen, or 1 per cent solution of chromic acid. In addition, sodium perborate or potassium chlorate solutions are recommended as mouth washes. Nicotinic acid, either hypodermically or orally in tablet form, should be given as a supporting treatment. Arsenic is given to chronic cases or cases that do not respond to the above treatment. Neosarsphenamine is given intravenously at three-day intervals. Aricyl 2 cc. on alternate days is also beneficial. In aged dogs where the disease is associated with pyorrhea, cleaning up the tartar and removing

the diseased teeth is necessary. It may be necessary to remove any tooth causing a contact ulcer on the cheek or lip. In severe cases it may be necessary to extract all of the teeth to control the disease.

COSMETIC GOLD CROWNS

Crowning broken teeth with gold is sometimes demanded by owners who desire to show off to their friends. A black Persian show cat that accidentally broke off an upper tusk became a dental patient when the loss of the tooth allowed the lip to drop and thus spoiled its appearance for show purposes. A dentist took an impression of the broken crown and molded a gold crown which he held in place with cement and a steel peg inserted into the root canal. The cat remained famous in shows and stud and was the object of a great deal of comment when on exhibition. The crown remained intact for three years and when accidentally lost it was replaced.

The case of a Boston Terrier was equally successful, except that he always lost his gold crown in fighting and had to have his decoration replaced frequently. This dog would show off by curling up his lip to exhibit the gold tooth.

ORTHODONTISTRY

Orthodontistry is the branch of dental surgery dealing with malposition of permanent teeth. Any person raising show dogs is disappointed when an otherwise perfect pup develops undershot or overshot incisors. These congenital defects are disqualifying. In certain selected cases having perfectly aligned canines, it is possible to move the incisors backward or forward until the bite is corrected. This is a specialized art requiring the aid of a good dentist experienced in this work in children. Most veterinarians have such specialists among their clients who are interested in work of this kind and glad to offer their advice and aid.

The veterinarian provides the kind of restraint the dentist will require to take the dentocol impressions. He sets up models of artificial dental stones and constructs the bands and the correction wires on the model. Then, under the proper

restraint, he fits them in place. The art of taking the impressions and setting up the plaster molds, building the casting bands and the spring wires is fairly simple, and once one is familiar with the routine, there is no reason that a veterinarian so inclined could not be able to do the whole procedure unaided. Dogs usually tolerate the correction bands after the first few days. They should be confined in solitary quarters where there will be no temptation to fight with litter mates or to chew hard objects.

The incisor teeth are so loosely embedded that they have room to move. Once in place, the natural bite has a tendency to hold them.

The two anchor bands are applied to the large canines and a spring wire is fitted from the bands across the teeth, either in front or behind, as the case may warrant. The correction comes from two factors, namely, (1) the spring wire causes pressure which forces the teeth into place and (2) the teeth tend to recede and draw away from contact with the wire.

It is possible to correct a bite and to move the incisors into position in from five to nine weeks. As the teeth move into position, the adjustment is helped by springing the contact wire from time to time into a better place as the case requires. It is best to wait until the pup is 7 months old and has a permanent and fully developed mouth before attempting the correction. If the start is made earlier when the teeth are growing rapidly, the bands become too small and get out of position.

The secretary of the Canadian Kennel Club has stated that he can see no reason that the practice should be frowned upon or considered illegal. What the American Kennel Club would rule in this respect, I do not know.

CONCLUSION

The first time a well-known dentist was consulted about correcting the incisors of a pup, his first words were "open wide please." What a pleasure canine dentistry would be if we could have the kind of coöperation from our patients those words express, since controlling the animal prop-

erly is often more a problem than the actual work.

Canine dentistry is mainly concerned in extractions, whereas human dentistry is largely the art of prolonging the life of teeth by treating cavities.

ACKNOWLEDGMENTS

For advice and coöperation in orthodontistry cases in dogs I am greatly indebted to J. M. Sheldon and H. Halderson, busy Toronto dentists, whose only reward was giving a helping hand to a kindred profession.

Applied Veterinary Science

Intelligent application of veterinary science will not forever lag behind the other learned professions. Human wisdom born of necessity is rapidly coming to its rescue. The work of the trained veterinarian harmonizes too well with the fundamental objectives of mankind to be overlooked in the struggle of the nations for social security and economic strength.

Bitter Milk

Bitter milk is caused by the fat-splitting enzyme, lipase, a product occurring in the liver, pancreas and abomasum. Bitterness in milk from this cause is detected a few hours after milking. Although but one or two cows may be affected, all of the milk of the herd is embittered in the mixing.

The trouble occurs toward the end of lactation in the late winter, early spring, or late fall when cows are on dry pastures.

To overcome the misfortune, the affected cows must be located by setting out milk from all of them and tasting the milk of each after a few hours.

Bitter milk is not harmful. By heating it to 180° F. for a few minutes, it can be used for household purposes.

Mother's blood, 400 cc. subcutaneously, is a correct preventive treatment for calf scours.—*Case*.

Treatment of the Canine Heartworm (*Dirofilaria immitis*) with Fuadin and Sulfanilamide*

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THE EXPERIENCE of several workers indicates that fuadin is at present the drug of choice for the treatment of canine heartworm, *Dirofilaria immitis*. Fuadin is a 6.3 per cent solution of sodium antimony bis-catechol disulfonate of sodium containing 13.5 per cent trivalent antimony. That fuadin, however, is not an ideal therapeutic agent is evident from the experience of Wright and Underwood,¹ who found that in order to treat to a cure the drug must often be continued for a considerable period and such treatments, therefore, are expensive. Repeated daily injections of fuadin for a month and more have been necessary to cure certain dogs. Fuadin may, in individual cases, be dangerous in the dosage usually employed as is indicated by the death of dogs undergoing treatment with this drug.

It is thus evident that present methods of treatment with fuadin are not ideal. We, therefore, have been interested in devising a treatment that combines safety, efficiency and economy. The senior author² tried sulfonamide compounds intramuscularly and intravenously against heartworm without success. Since one suggested mode of action of sulfanilamide is that of stimulating phagocytosis, it was considered possible that adults and microfilariae injured by fuadin might be affected by a phagocytic action stimulated by sulfanilamide. In other words, fuadin and sulfanilamide might have synergistic action. Hence, our studies were designed to test the effect of combined therapy of these two drugs on heartworm in dogs.

*From the School of Public Health, University of North Carolina. The drugs used in this study were supplied through the courtesy of Winthrop Chemical Company, Inc.

¹Wright, W. H., and Underwood, P. C.: Vet. Med., xxix (1934), p. 234.

²Brown, H. W.: Proc. Soc. Exp. Biol. & Med., xxxix (1938), p. 98.

METHODS

The microfilaria counts on the blood of infected dogs were made by spreading 0.1 cc. of blood over a 3x1 glass slide. A tuberculin syringe graduated in 0.01 cc. was used for this purpose. After drying, the smear was stained with Giemsa and all the larvae on the slide were counted under low power of the microscope. In order to eliminate the complicating periodicity of the microfilariae, all peripheral blood for larval counts was drawn at 4:00 p.m. Usually two slide preparations were made, counted and the results averaged. Counts on different 0.1-cc. amounts, from the same syringe-ful of blood, as well as those on blood taken from the same dog at intervals, in general checked rather closely.

The fuadin was injected intramuscularly into the gluteal or prescapular muscles of the legs, alternating the four legs. The sulfanilamide pills of 5-gr. size were given by the mouth and were followed by a swallow of water.

The dogs were all kept on a diet of purina dog chow and canned dog food. They all maintained their weight during the course of the experiments.

RESULTS

To test whether or not preliminary treatment with sulfanilamide enhanced the effect of subsequent treatment with fuadin, two dogs weighing 21 and 22 kg. were given courses of both drugs. A course of 45 gr. of sulfanilamide daily for 16 days was followed by twelve days of fuadin treatment. One cc. of fuadin was given daily for the first six days and 1.5 cc. daily for the second six days. That this combination of drugs has no advantage over fuadin alone is indicated by the microfilaria counts decreasing only from 90 to 60 per cubic centimeter of blood in one dog and from 400 to 130 per cubic centimeter in the other dog. Fuadin alone in the above doses gives similar microfilaria reductions.

Dogs 2, 4, 5 and 6 (table I) were given preliminary doses of sulfanilamide for from three to six days and were then given a course of sulfanilamide and fuadin simultaneously. The reduction in microfilaria

count was 80, 22, 99 and 50 per cent, respectively. The data on these dogs are summarized in table I. It is quite apparent that except for dog 5, the method of treatment and dosage employed were not adequate. The sulfanilamide was given to dogs 4 and 6 in daily doses. Such dosage probably does not maintain a maximum blood concentration. Marshall, Emerson and Cutting³ have shown that several doses daily are necessary to maintain a high sulfanilamide blood level. Other criticisms of the treatment of these four dogs are that the sulfanilamide was not continued throughout the treatment of one dog (No. 4) and that the fuadin dosage was too small (dog 2).

The above preliminary treatments emphasize two important points, namely, that if we are to expect any effect from the sulfanilamide it must be given more fre-

quently than once daily and, secondly, that the fuadin should be given in larger doses than used in our early experiments. It was decided, therefore, to give the dogs an intensive combined treatment for a ten-day period. Six dogs (Nos. 9-14, table II) were given a ten-day continuous sulfanilamide and fuadin treatment.

The sulfanilamide dosage varied from 4 to 5 gr. per kilogram of body weight and was divided into two daily doses. The dogs weighing from 11 to 15 kg. received four days' dosage of 1 cc. of fuadin followed by six days of 1.5 cc. The two dogs weighing 20 kg. were given 1.5 cc. of fuadin daily for four days and 2 cc. daily for the remaining six days. Table III gives the dosage rate employed.

It will be seen from table II that the combined sulfanilamide-fuadin treatment for ten days was very successful, especially as indicated by microfilaria counts. The microfilaria counts of five of the six dogs

³Marshall, E. K., Emerson, K., and Cutting, W. C.: J.A.M.A., cviii (1937), p. 953.

TABLE I—*Dirofilaria immitis*-Infected Dogs Treated with Sulfanilamide and Fuadin

WEIGHT		DAYS																																			
		1	2	3	4	5	6	7*	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25											
Dog 2 23 kg.	Sulfanilamide, gr.	30	30-30	30-30	30-30	30-30	30-30		30-30	30-30	30-30	30-30	30-30	30-30	30-30	2	Autopsied on 25th day. No adult <i>Dirofilariae</i> ; 25 hookworms; 35 <i>Trichuris</i> sp.																				
	Fuadin, cc.						1		1	1	1	1	1	1	1																						
	Larvae per cc. blood	100							10					0	0																						
Dog 4 22 kg.	Sulfanilamide, gr.	45	45	45	45	45	45	45	45			45	30	30	30	30	30																				
	Fuadin, cc.												.5	.5	1.5	1.5	1.5	2	2	2	2	2	2														
	Larvae per cc. blood	230														140		180				180															
Dog 5 12 kg.	Sulfanilamide, gr.	30-30	30-30	30-30	30-30	30-30	30-30	30-30	45-30	30-30	30-30	45-30	45-30	30-30	30-30	45-45	Autopsied on 48th day. No adult <i>Dirofilariae</i> ; 5 micro- filariae per cc. blood.																				
	Fuadin, cc.				1	1	1	1	1	1	1	1.5	1.5	1.5	2	2										2											
	Larvae per cc. blood	1,050									980															0										5	
Dog 6 25 kg.	Sulfanilamide, gr.	30-30	30-30	30-30	20	20	20	20	20	20	20																										
	Fuadin, cc.				1	0	1	0	1	5	1	5	2	0	2	0																					
	Larvae per cc. blood	20										15					10																				

*Reaction occurred on seventh day.

TABLE II—*Dirofilaria immitis*-Infected Dogs Treated with Sulfanilamide and Fuadin

WEIGHT		DAYS														LARVAL REDUCTION	AUTOPSY
		1	2	3	4	5	6	7	8	9	10	18	25	32			
Dog 9 11 kg.	Sulfanilamide, gr.	45	25- 20	25- 20	25- 20	25- 20	25- 20	25- 20	25- 20	25- 20	25- 20					100%	Negative
	Fuadin, cc.	1.0	1.0	1.0	1.0	1.5	1.5	1.5	1.5	1.5	1.5						
	Larvae per cc. blood	130									0	0	0	0			
Dog 10 12 kg.	Sulfanilamide, gr.	45	25- 20	25- 20	25- 20	25- 20	25- 20	25- 20	25- 20	25- 20	25- 20					100%	Negative
	Fuadin, cc.	1.0	1.0	1.0	1.0	1.5	1.5	1.5	1.5	1.5	1.5						
	Larvae per cc. blood	130									0	0	0	0			
Dog 11 20 kg.	Sulfanilamide, gr.	90	45- 45	45- 45	45- 45	45- 45	45- 45	45- 45	45- 45	45- 45	45- 45					100%	6M 12F in right ven- tricle
	Fuadin, cc.	1.5	1.5	1.5	1.5	2.0	2.0	2.0	2.0	2.0	2.0						
	Larvae per cc. blood	23,330									0	0	0	0			
Dog 12 13 kg.	Sulfanilamide, gr.	45	25- 20	25- 20	25- 20	25- 20	25- 20	25- 20	25- 20	25- 20	25- 20					100%	Negative
	Fuadin, cc.	1.0	1.0	1.0	1.0	1.5	1.5	1.5	1.5	1.5	1.5						
	Larvae per cc. blood	250									0	0	0	0			
Dog 13 15 kg.	Sulfanilamide, gr.	60	30- 30	30- 30	30- 30	30- 30	30- 30	30- 30	30- 30	30- 30	30- 30					100%	20 worms in right ven- tricle and pulmonary artery
	Fuadin, cc.	1.0	1.0	1.0	1.0	1.5	1.5	1.5	1.5	1.5	1.5						
	Larvae per cc. blood	1,090									0	0	0	0			
Dog 14 20 kg.	Sulfanilamide, gr.	90	45- 45	45- 45	45- 45	45- 45	45- 45	45- 45	45- 45	45- 45	45- 45					96%	No worms in heart or pulmonary vessels
	Fuadin, cc.	1.5	1.5	1.5	1.5	2.0	2.0	2.0	2.0	2.0	2.0						
	Larvae per cc. blood	370									20	20	15	15			

were reduced to zero by the completion of the ten-day series of treatments. Additional blood examinations of these dogs made 8, 15 and 22 days after the conclusion of the treatments likewise failed to reveal microfilariae. The preliminary microfilaria count before treatment varied from 130 per cubic centimeter (dogs 9 and 10) to 23,330 per cubic centimeter (dog 11).

All five of the dogs made microfilaria-negative by treatment were autopsied 22 days after the last treatment. Adult worms were found in the heart or lungs of two of the dogs. Six males and twelve females, all alive, were found in the right ventricle of dog 11. Twenty adult worms, several of which were alive but the remainder dead and disintegrating, were found in the heart and lungs of dog 13. Examination of several female worms from each group failed to reveal the presence of larvae.

Only one dog (No. 14) given the ten-day combined sulfanilamide-fuadin treatment failed to have the microfilariae cleared out

of its blood stream. This dog had a larval count of 370 per cubic centimeter at the beginning of the treatment, 20 per cubic centimeter after ten days of treatment, 20 per cubic centimeter eight days after completion of the treatment, and 15 per cubic centimeter 15 and 22 days after treatment. The treatment resulted in a 96 per cent microfilaria reduction. No adult worms were found in the heart or lungs at autopsy.

As controls for the dogs given the ten-day combined sulfanilamide and fuadin treatment, four dogs were given a ten-day treatment of fuadin alone (table IV). The blood of two of these dogs was cleared of microfilariae by this treatment. Of the dogs not rendered free of microfilariae, one exhibited an 88 per cent larval reduction and the other no reduction. The microfilaria counts of these four dogs were all initially light, varying from 40 to 190 per cubic centimeter. Autopsy of three of the fuadin-treated dogs failed to disclose any

TABLE III—Dosage Suggested for Combined Sulfanilamide-Fuadin Treatment

WEIGHT		DAYS									
		1	2	3	4	5	6	7	8	9	10
10-14.9 kg.	*Sulfanilamide, gr. †Fuadin, cc.	45 1.0	45 1.0	45 1.0	45 1.0	45 1.5	45 1.5	45 1.5	45 1.5	45 1.5	45 1.5
15-19.9 kg.	Sulfanilamide, gr. Fuadin, cc.	60 1.0	60 1.0	60 1.0	60 1.0	60 1.5	60 1.5	60 1.5	60 1.5	60 1.5	60 1.5
20-25 kg.	Sulfanilamide, gr. Fuadin, cc.	90 1.5	90 1.5	90 1.5	90 1.5	90 2.0	90 2.0	90 2.0	90 2.0	90 2.0	90 2.0

*Sulfanilamide divided into two doses, given by the mouth morning and evening.

†Fuadin given intramuscularly as a single dose in the morning.

adult *Dirofilaria* in the heart or lungs of the dogs.

REACTION TO TREATMENT

Three dogs receiving the combined sulfanilamide and fuadin therapy suffered from reactions characterized by moderate fever, loss of appetite and malaise. These reactions lasted for several days, yet they were not considered of sufficient severity to necessitate withdrawal of treatment. It is impossible to state whether or not the high fever and possibly other physiological changes during the reaction to the drug modified the effectivity of the drug. Two of the dogs manifesting drug reactions were rendered microfilaria-free, while microfilariae persisted in the blood of the third dog after treatment accompanied by a reaction.

Three dogs were afflicted with a peculiar opaque whitish discoloration of the cornea during treatment. This condition was bilateral in two dogs and unilateral in the third. The dogs were apparently temporarily blinded by the opacity. The condi-

tion arose on the fifth to seventh day of treatment, lasted four or five days and disappeared spontaneously despite the continuation of treatment. If this eye condition was due to the drugs, it was probably due to fuadin rather than sulfanilamide as it appeared in one dog treated with fuadin alone.

DISCUSSION

It is apparent from our data that a combined sulfanilamide and fuadin course of treatment continued for ten days is effective against the canine heartworm, *Dirofilaria immitis*. Five of the dogs so treated were rendered free of microfilariae as judged by stained preparations of 0.1 cc. of peripheral blood. The sixth dog given the combined treatment had its microfilaria count reduced 96 per cent.

Autopsy of the sulfanilamide-fuadin treated dogs revealed adult worms in the heart or pulmonary vessels of only two of the six dogs. Examination of the female worms recovered failed to reveal the presence of larvae in the uteri of the majority

TABLE IV—*Dirofilaria immitis*-Infected Dogs Treated with Fuadin

WEIGHT		DAYS											LARVAL REDUCTION	AUTOPSY
		1	2	3	4	5	6	7	8	9	10	18		
Dog 14 kg.	Fuadin, cc. Larvae per cc. blood	1.0 50	1.0	1.0	1.0	1.5	1.5	1.5	1.5	1.5	1.5 0	0	100%	Negative
Dog 15 17 kg.	Fuadin, cc. Larvae per cc. blood	1.0 40	1.0	1.0	1.0	1.5	1.5	1.5	1.5	1.5	1.5 25	5	88%	Negative
Dog 16 13 kg.	Fuadin, cc. Larvae per cc. blood	1.0 190	1.0	1.0	1.0	1.5	1.5	1.5	1.5	1.5	1.5 50	210	0	
Dog 17 24 kg.	Fuadin, cc. Larvae per cc. blood	1.5 50	1.5	1.5	1.5	2.0	2.0	2.0	2.0	2.0	2.0 0	0	100%	Negative

of them. A number of the adult worms were dead and were beginning to disintegrate.

Four dogs given the sulfanilamide-fuadin treatment and three dogs given the fuadin treatment alone were negative for adult worms in the heart or pulmonary vessels at autopsy. Three of these dogs had microfilariae in their peripheral blood the day they were destroyed. It appears that four explanations are possible for the finding of microfilariae in the blood in the absence of adults in the heart:

1) The adult worms were killed by the treatment and disintegrated before autopsy. This explanation, however, does not appear entirely sound inasmuch as the adults, alive and dead, are frequently found in the heart and pulmonary vessels of some dogs as long as 22 days following treatment (dogs 11 and 13).

2) The adult worms, alive or dead, were missed on autopsy of the heart and pulmonary vessels. This is not an unlikely explanation for in every instance that adult worms were not found, the infection was light as judged by the microfilaria count.

3) Adult *Dirofilariae* were not in the heart or pulmonary vessels but in some other portion of the body, possibly the lymph system, and thereby escaped detection.

4) The adult worms had died and disintegrated some time previous to treatment, leaving the blood stream microfilaria-infected.

Whatever is the true explanation of the absence of adult worms, it is apparent that therapeutic tests against heartworm should be done on dogs with numerous microfilariae in order to insure, if possible, the presence of adults in the heart.

Our data indicate that a combined sulfanilamide-fuadin therapy continued for ten consecutive days is an effective treatment for canine heartworm. Wright and Underwood¹ suggested a six-day treatment series with fuadin, this series to be repeated after a one-day interval if a cure

does not result. It is apparent from their studies that the six-day fuadin treatment was not sufficient in many cases, hence second, third and fourth six-day series of treatment were given. One drawback of these short series of treatment with fuadin is that it takes several days of fuadin therapy to produce therapeutic concentrations of the drug in the blood. Every time the drug is discontinued, the process of building up the blood concentration must be repeated. It, therefore, appears logical to us to give a single series of injections to cure before allowing the drug concentration in the blood to fall. A ten-day series of the drug evidently is sufficient in the majority of cases.

Whether or not sulfanilamide enhances the action of fuadin and results in a greater percentage of cures than are produced by fuadin alone is problematical. Our data suggest such may be the case. Fuadin alone resulted in a complete cure, as judged by the presence of microfilariae, in two out of the four dogs (50%) treated, while sulfanilamide-fuadin treatment resulted in a cure in five of the six dogs so treated (84%). It is obvious that a larger series must be treated before this question can be satisfactorily answered.

SUMMARY

Various doses and combinations of sulfanilamide and fuadin have been tested against heartworm in dogs. A ten-day series consisting of sulfanilamide by the mouth and fuadin intramuscularly resulted in the cure of five out of six dogs. A ten-day series of fuadin alone cured two out of four dogs.

In all history, domestic animals sold short, as the stock brokers say. Though domestic animals enabled man to start and develop a civilization, the historian writes only of men, their achievements, their murderous wars, and their too numerous failings. What domestic animals did contemporaneously in developing the wealth of the nations they enabled man to create is an omission in the world's written history.

Blood Transfusions in Dogs*

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BLOOD TRANSFUSION, as we in the veterinary profession know, has not received, except in a few instances, its proper place in our therapeutic armamentarium.

In a discussion of the therapeutic value of blood transfusion the physiological principles which are essential should be taken into consideration. Briefly, they are:

- 1) Immediate increase in fluid bulk or volume of circulating blood.
- 2) Immediate increase in oxygen-carrying capacity of blood.
- 3) Increase in coagulability of blood.
- 4) Possible stimulation of hematopoiesis.
- 5) Possible immunologic factors.

These principles form the basis for rational indications for blood transfusion, as follows:

- 1) Hemorrhage of either operative or traumatic origin.
- 2) Anemia.
- 3) Shock (surgical or traumatic).
- 4) Pre- and post-operative therapy.
- 5) Intoxications (toxemias).
 - a) Uremia.
 - b) Extensive burns.
 - c) Gas poisoning.

- 6) Debilitating diseases.

The infusion of other fluids, such as saline or saline and dextrose, is the general practice in these conditions. Naturally, this is of value, but in many cases the benefits were definitely limited and transitory. No substance other than blood can relieve so adequately and so physiologically the manifestations produced by blood loss.

The logical basis for blood transfusion is a condition in which there is a loss of blood. This fact is perfectly obvious as the diminished intravascular fluid bulk is restored immediately and there is no loss by diffusion into the tissues as there would be with saline-glucose or normal saline. The

decreased oxygen-carrying capacity can be returned to normal immediately.

Another rational basis for transfusion is the hemostatic influence of blood, since in hemorrhage and jaundice as well as in certain other conditions there may occur a diminution of the elements necessary for coagulation. Therefore, transfusion of blood is indicated in all conditions in which there is an acute, subacute or chronic loss of blood. The timely performance of blood transfusion in severe hemorrhage during an operation is a life-saving measure as patients may go into shock due to great blood loss which this thus prevents. The fallacious belief that renewed bleeding might occur in these cases following blood transfusion, due to the increased blood pressure and subsequent dislodgment of a thrombus, is entirely unfounded, according to DeBakey,¹ but conversely the arrested hemorrhage has always been effective.

In anemias the increase in the oxygen-carrying capacity of the blood due to the addition of large numbers of erythrocytes is of marked benefit. It is a well-established fact that one of the important effects of blood transfusion in anemia is the substantial increase and maintenance of fluid in the vascular system.

The effect of blood transfusion as a stimulation to hematopoiesis is of great importance. This is believed to be due to the fact that the transfused erythrocytes actively function and thereby lessen the demand upon the blood-forming organs, thus permitting a resting period during which the hematopoietic system can recover. Transfusion thus breaks a vicious cycle and produces an improved condition in the bone-marrow cells, thereby allowing the system to return to more normal functioning.

In the treatment and prevention of shock no other procedure is of greater importance

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¹DeBakey, M., and Honold, E.: Blood transfusion. *Int. Med. Dig.*, xxxiii (Nov. 1938), p. 308.

than the performance of an immediate blood transfusion. The injection of fluids having a slight viscosity, such as isotonic salt or saline and dextrose, is sufficient in most cases. In many instances, however, it is of only transitory value. This is due to the fact that these fluids merely dilute plasma protein with a consequent diminution of osmotic pressure and increase of the filtering force in the capillaries. This allows a rapid escape of the fluid into the tissues and urine. A state of shock, therefore, soon may return in many cases. When blood is injected, however, it is retained within the vascular system because its viscosity, its colloid, and electrolyte content maintains a normal osmotic pressure.

The prevention of shock is of even greater importance than treatment. In view of this, blood should be administered following severe and prolonged operative procedures and the mortality as well as the morbidity in such operations should, therefore, materially decrease and the rapid post-operative convalescence further emphasize its value. Blood transfusion has a decided prophylactic value, not only in increasing operative ability, but also in converting poor surgical risks into good ones.

The possible immunologic effect of blood transfusion has not been definitely proved although we have had some favorable results in distemper. These improvements simply may be due, however, to the addition of red blood cells and perhaps to some normal immunity factors which may have been present in the blood of the donor which enabled the patient to be tided over a crucial period until his resistance was able to overcome the infection. Perhaps blood transfusion even transfers immunologic substances, or else stimulates the antibacterial powers of the recipient.

In certain forms of intoxications and poisoning blood transfusion has been of definite value. This is particularly true in those conditions in which the hemoglobin of a large number of erythrocytes combine with a poison to form a stable methemoglobin and thereby lose the ability to carry oxygen to the tissues. This is particularly true in CO poisoning. Blood transfusion

replaces those functionless cells removed by exsanguination and thus carries on the work.

Blood transfusions have been of undeniable value in the treatment of sepsis. The best results, however, have been obtained in the more chronic or prolonged type, such as pyometra. In the acute and peracute infections, we have found transfusion to be of little or no value.

The general tonic effect of transfusion is undoubtedly of value in the correction of many associated physiologic disorders, such as acidosis, dehydration, consequent emaciation and impartial marasmus. Thus, a seriously ill patient can be tided over a crucial period until the body resistance is able to cope with the infection.

In debilitating conditions, such as carcinoma, cachexia and other chronic disease conditions, blood transfusion is of only palliative or supportive value.

The conditions in which blood transfusions are contraindicated are those involving the lungs, such as pneumonia and pulmonary edema. This is due to the fact that the blood, because it can not pass through the lung capillaries fast enough, causes an abnormal strain upon the heart, often resulting in its failure. Blood transfusion is also contraindicated in severe nephritic conditions associated with anuria and oligurea.

BLOOD GROUPS

According to Wiener² inasmuch as dogs, for all practical purposes, are of the same group, any dog may be suitable for another. However, in those cases in which a dog is subject to repeated transfusions from the same donor, it is advisable to cross-match, as a sensitization may develop which would render the donor incompatible to this dog thereafter. Melenick and Cowgill³ state that there is only one chance out of four that incompatibility will occur when a dog is subjected to repeated infusions from the same donor animal. In giving repeated

²Wiener, A. S.: Blood groups and blood transfusion (Chas. C. Thomas, Springfield, Ill., 1935).

³Melenick, D., and Cowgill, G. R.: Blood groups in dogs. *Proc. Soc. Exp. Biol. & Med.*, xxxvi (June 1937), pp. 697-700.

transfusions, therefore, we use a different donor for each transfusion, thereby eliminating this possibility, and no typing is necessary. Some authorities suspect that purebred dogs may show a pronounced type and if this occurred, there would be some danger in the transfer of blood from a purebred to a purebred. In the absence of first-hand data on this phase, we would recommend that the typing test be applied when transfusing from a purebred to a purebred.

METHODS AND MATERIALS

Blood transfusions have not been administered frequently in the past because the majority of them were cumbersome and time-consuming, and consequently, impractical for the ordinary practitioner. The method formerly used was to have three 20-cc. syringes, sterile normal saline for washing syringes, an 18- or 20-gauge needle, and a supply of 3 per cent citrate. Two cc. of this citrate solution was drawn into each syringe before used to draw blood to prevent coagulation in the syringe. At least two trained assistants, besides the veterinarian, were required to complete the transfusion. The blood was drawn from the jugular vein of the donor and was injected into either the saphenous or radial vein of the recipient. The used syringe had to be washed in sterile saline before it was used again to remove any clotted blood. As the veterinarian injected the blood into the recipient, one assistant would continue to withdraw blood from the jugular vein of the donor with another syringe, while the second assistant was washing the used syringe and filling it with citrate in preparation for further use.

Obviously, this method was not satisfactory because of its complicated nature, risk of clotting and need for so many assistants.

The methods which we have used here at the hospital and which have brought a high degree of satisfaction are direct transfusion with the Scannell transfusion apparatus, indirect transfusion with citrated blood and the maintenance of a blood bank.

PREPARATION FOR TRANSFUSION

No matter what type of transfusion is to be used the preliminary preparation should be the same. Select a strong, healthy, mature dog, preferably 3 years or older, in the belief that it probably has had distemper (thereby reducing the chances of using a donor which may be in the incubative stage). We have, however, used younger dogs when we have been able to observe them for a week or more. The donor should be fasted for 18 to 24 hours before being used in order that the chances of allergic food reactions will be reduced. The donor is then anesthetized with nembutal and laid on its right side. By the use of a general anesthetic such as nembutal, struggling and pain are prevented, thus improving technic in addition to eliminating the need for another attendant. Also, nembutal has not been found to affect the blood. The area on the left side of the lower thoracic region, bounded by the third to sixth ribs, and from the intercostal junction upward about 4 in. is clipped and shaved, washed, and painted with tincture of metaphen or mercresin, and the body covered with a shroud which has an elliptical opening about 3 in. long. A sterile 12- or 13-gauge Lewisohn needle, which is $1\frac{1}{2}$ to 2 in. in length, is inserted between the ribs where the pulsation of the apex beat of the heart can be seen or felt, generally between the fourth and fifth ribs. Upon insertion through the thoracic wall, the beating of the heart can be felt against the point of the needle. With a firm, quick thrust, the needle pierces the heart wall and enters one of the ventricles. The blood then flows out with each ventricular contraction. The 12- or 13-gauge needle is recommended because its large caliber allows for a rapid, free flow of blood with a minimum amount of damage to the cells and decreases the chances of clotting within the needle, a problem faced when smaller needles are used. We select the heart as our source of blood in all cases in preference to the jugular vein, first because the heart has not been found to be affected, whereas in the jugular vein hematomas sometimes appear. The use of the heart is especially preferred

in smaller animals because the jugular vein is sometimes difficult to locate. Lockhart⁴ cautions against the danger of puncturing the coronary vessels, but our experience shows that this danger can be minimized, as on autopsy we have found that such a perforation caused no unfavorable reaction.

At our hospital we employ both the direct transfusion of blood, using the Scannell transfusion apparatus, and the indirect method, using citrated blood, either immediately or banking it for future use.

Direct Transfusion.—Briefly, the Scannell transfusion apparatus consists of a 20-cc. syringe, a three-way mechanical valve from which run three tubes, one for carrying blood from the donor into the syringe, one leading to the recipient and the other running to a beaker of saline, by means of which the syringe can be flushed. Only one assistant and the veterinarian are required to perform a transfusion in this manner. The donor is prepared as previously described. The beaker containing 100 to 200 cc. of sterile normal saline is heated to body temperature. Tubing, needles and syringes should be boiled or dry-sterilized in an autoclave. The caliber of the needle used for the recipient is a very important factor. We have found that it is impractical to use anything less than a 20-gauge and preferably an 18- or 15-gauge needle, 18-gauge being used most frequently, the size naturally depending upon the size of the vein. It should be 1½ in. long. The needle is inserted into either the saphenous or radial veins, or if they can not be raised, into the jugular. The middle tube is immersed in the saline and the saline drawn into the syringe. The valve is turned to the tube leading to the recipient, forcing the saline through the tube, clearing it of air. The end of the tube is then attached to the needle in the vein of the recipient and a few cubic centimeters of saline forced into the recipient to prevent clotting in the needle. The needle is then inserted into the heart of the donor as already described. The valve is turned to the tube leading to the donor, forcing

saline through and freeing it of air, and the tube attached to the needle in the heart of the donor. The blood is then withdrawn to the capacity of the syringe as rapidly as possible and then, by control of the valve, injected into the recipient. The valve is then turned and more blood withdrawn from the donor and injected into the recipient until the required amount is administered. It is important after every fourth syringe full of blood is taken that the syringe be flushed with saline to prevent or remove clots.

A factor to remember in a direct transfusion is that too slow withdrawal of blood from the donor may result in clotting and that the success of a direct blood transfusion depends on one factor: the rapid transfer of blood from donor to recipient.

Indirect Transfusion.—For indirect transfusion, the preparation of the donor is the same as previously described.

The apparatus (fig. 1) we use for the collection of blood to be used in indirect transfusion is a modification of that employed by Cameron and Ferguson.⁵ It consists of (A) a graduated 500-cc. Erlenmeyer flask (pyrex), (B) a three-hole rubber stopper into which are inserted three glass tubes each having an inside diameter of 3/16 of an inch, one tube (C) being 12 in. long into which is inserted (D) a cotton filter, the second tube (E) 7 in. long, and the third (F) 2½ in. from one end. The shorter ends are then inserted into the rubber stopper as is the 2½-in. tube, so that they are just flush with the bottom of the stopper. An ordinary rubber eye-dropper cap is placed over the short tube and firmly glued. To the 7-in. tube is attached (G) a 9-in. section of pure para rubber tubing with an inside diameter of 3/16 in. To the end of the tube is attached a Luer adapter. To be needed later is a rubber sani-tab (Duval) cap, 2 in. in diameter which is to be placed over the mouth of the flask after the blood is collected.

Too much stress can not be placed upon the importance of proper cleaning and sterilization of instruments, and the careful

⁴Lockhart, A.: Modified blood transfusion in dogs. *Canine and Feline Practice*, II (Feb. 1936), p. 52.

⁵Cameron, C. S., and Ferguson, L. K.: Organization of blood bank. *Surg.*, v (Feb. 1939), p. 241.

preparation of solutions. The chance for foreign protein, emboli and toxic reaction, which may result from improper preparation of instruments and solution, may thus be reduced to a minimum. The apparatus is sterilized either by autoclaving or boiling.

The amount of citrate used in indirect transfusion must be guarded as an insufficient amount may cause clotting and too much may cause too rapid hemolysis. Following Amadon's⁶ suggestion, we use 3 per cent sodium citrate, 10 cc. to each 100 cc. of blood. To further lessen the chance of hemolysis we endeavor to keep the pH between 7.1-7.5, as Cotter and MacNeal⁷ have proved that less destruction of erythrocytes takes place at this pH. The sodium citrate solution is prepared with distilled water and sterilized by boiling. This may be prepared in advance in 100-cc. flasks, sterilized and capped aseptically.

The citrate, proportionate to the amount of blood to be withdrawn, is placed in the flask, *i.e.*, 50 cc. of the 3 per cent sodium citrate solution for 500 cc. of blood. The assembled stopper is then fitted tightly into the flask. A sterile 13-gauge Lewisohn needle is attached to the adapter and inserted into the heart as previously described. A condition of negative pressure is created within the flask by placing the mouth over the free end of the longer tube and gently sucking the air from within the flask. As a backflow of saliva may occur at times, the purpose of the cotton filter can be readily understood. Negative pressure also may be induced by the use of a water suction pump as described by Lacroix,⁸ which we have used with success. This negative pressure naturally causes a rapid and free flow of blood into the flask. While the blood is flowing into this container, the flask is gently oscillated to insure a thorough mixing of the blood with the anticoagulant. When the desired amount of blood is obtained, the needle is with-

drawn from the heart, the stopper is easily removed aseptically and the sterile sani-tab cap is placed over the mouth of the flask and left there until the blood is used. The purpose of the rubber cap on the third tube is to provide a means for injecting additional citrate into the flask by means of a syringe, while still collecting the blood, thus keeping a closed system and not destroying the negative pressure.

When more than 500 cc. of blood is withdrawn the flasks are changed without removing the needle from the heart and the stopper is removed from the first flask and inserted into the second.

This blood, thus collected in a sterile manner, may be used either immediately or refrigerated at 39° F. (4° C.). Refrigerated blood is inspected daily for any signs of bacterial contamination, excessive hemolysis or clotting, and we discard any blood which can be regarded as suspicious or unfit for use. As recommended by certain authorities⁹ it has been our practice to discard blood which is over ten days old, although it may appear to be in satisfactory condition. We have, however, used blood a month old with no unfavorable reaction, but this may have been the exception rather than the rule. The need for daily inspection of the refrigerated blood is brought about by the variability in speed of hemolysis of the blood from different donors. Since all blood is collected in the same manner, we assume that this variation in the rate of hemolysis—causing excessive hemolysis in some in three days, while others appear to be satisfactory even at the end of our arbitrary discarding period of ten days—would be due to the difference in the make-up of the individual donor's blood.

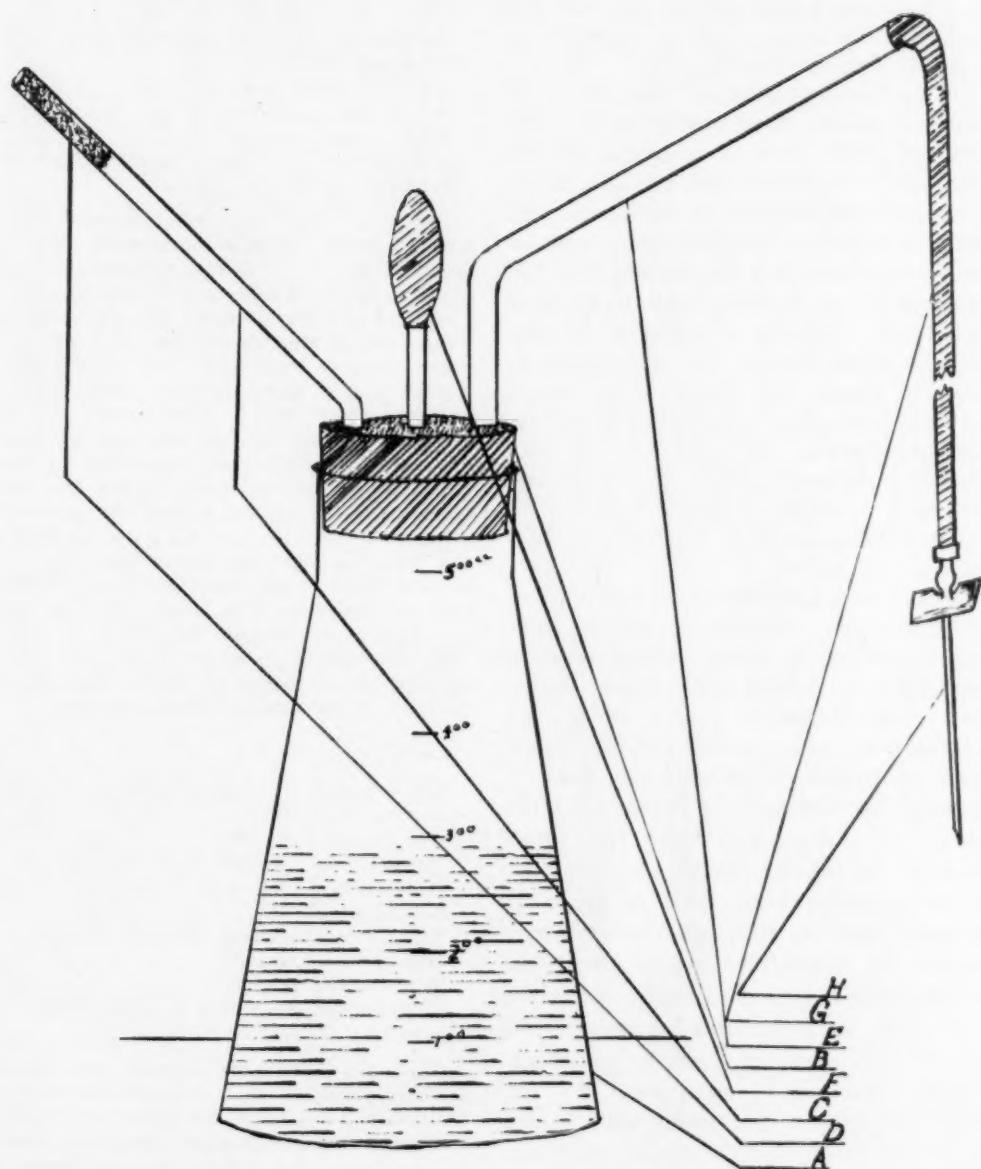
Since, during refrigeration, sedimentation naturally occurs, the flask must be gently agitated to mix the cells again with the plasma as a preliminary to preparing the blood for transfusion. The flask containing the blood, along with another flask containing 50 cc. of physiological saline, is

⁶Amadon, R. S.: Personal communication.

⁷Cotter, J., and MacNeal, W. J.: Citrate solution for preservation of fluid blood. *Proc. Soc. Exp. Biol. & Med.*, xxxviii (June 1938), pp. 757-758.

⁸Lacroix, J. V.: Discussion, "Blood transfusion in dogs." *J. A. V. M. A.*, xcii (Feb. 1938), p. 143.

⁹Editorial: Transfusion of preserved blood. *J. A. M. A.*, cxiii (Dec. 2, 1939), pp. 2061-2062.



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Fig. 1. Apparatus for the collection of blood for indirect transfusion.
(See page 485.)

then immersed in hot water until body temperature is reached. The saline is poured into the Kelly infusion jar to clear the tubing of air. The adapter is then connected with the needle which has been inserted into the vein of the recipient and the saline is then allowed to flow. The required amount of blood is then decanted through a sterile filter composed of four layers of gauze which was placed in the mouth of the Kelly infusion jar (fig. 2) to remove any clots which may have occurred. The speed at which the transfusion may be given is variable but I have found that the rate of 15 cc. per minute seems to be most satisfactory. This rate of speed can be controlled by screw clamps. In those cases in which the entire amount of blood is not used the flask should be immediately re-capped aseptically with a sterile cap and replaced in the refrigerator for future use. This blood, however, seems to hemolyze at a more rapid rate after having once been prepared for use.

We have used both the direct and indirect methods of blood transfusion and we have noted no difference in the results obtained when using unmodified whole blood as compared with citrated blood. With few exceptions we now use the indirect transfusion of banked citrated blood since it eliminates the necessity of keeping a large number of donors and does not interfere with the hospital routine as the blood can be collected when time is available. Compared with the direct method of administration of unmodified whole blood the indirect method is much simpler in that it is as easy to administer as saline and dextrose and may be given by assistants with the minimum of supervision.

No matter what method is used in the administering of blood it is essential that the transfusion be stopped immediately if any alarming symptoms occur.

Following are typical cases in which blood transfusions have played a major part. It should be noted that, although blood transfusion is not a cure-all, it has, in a majority of instances, been instrumental in producing a favorable outcome.

Case Reports

CASE 1.

WHFT, male, 6 years old, entered 8/30/39.

Diagnosis: arsenic poisoning.

Red count: 2,290,000.

White count: 24,700.

Differential: 90 p, 1 l, 1 eo., 8 myel.

Schilling: 54%.

9/5/39—transfusion 225 cc.

Red count: 5,530,000.

White count: 10,900.

Differential: 80 p, 9 l, 1 mon., 1 eo., 9 myel.

Schilling: 23%.

This dog, when examined, appeared anemic, weak, listless, mucous membranes pale, temperature 98.3° F. He had a history of eating grass sprayed with arsenic. Appetite was very poor, and at times absent. After a blood count we decided to give transfusion. Animal showed much improvement after first transfusion, becoming more alert, appetite improved, temperature 100.1° F. A blood count was again taken, and since it was low and the animal still was not sufficiently recovered, a second transfusion was indicated. After the second transfusion the animal picked up rapidly, had a ravenous appetite, and did much barking and tail wagging when the owner appeared, which he did not do previous to this. Temperature at this time was 101.9° F. The animal was kept in the hospital for five more days and was released in excellent condition. In our opinion, the recovery of this animal was due entirely to the administration of blood.

CASE 2.

Chow, female, entered 9/11/39.

Diagnosis: pyometra.

Red count: 2,860,000.

White count: 34,000.

Differential: 80 p, 6 l, 14 myel.

Schilling: 57%.

9/12/39—transfusion 240 cc. (direct).

Red count: 6,450,000.

White count: 21,200.

Differential: 67 p, 7 l, 1 e, 25 myel.

Schilling: 75%.

This dog upon examination was found to have a purulent vaginal discharge and upon palpation the uterine horns were found to be markedly enlarged and the above diagnosis was made. Dog was extremely emaciated, eyes sunken, dull coat, and showed weakness in standing. Due to extreme weakness operation was postponed and the next day a blood count was taken. At this time the dog was unable to rise and had no appetite. In view of the extremely low count and the serious condition of the animal it was thought advisable to give a blood transfusion. A transfusion was given and the next day the animal appeared much improved. It was able to stand and showed

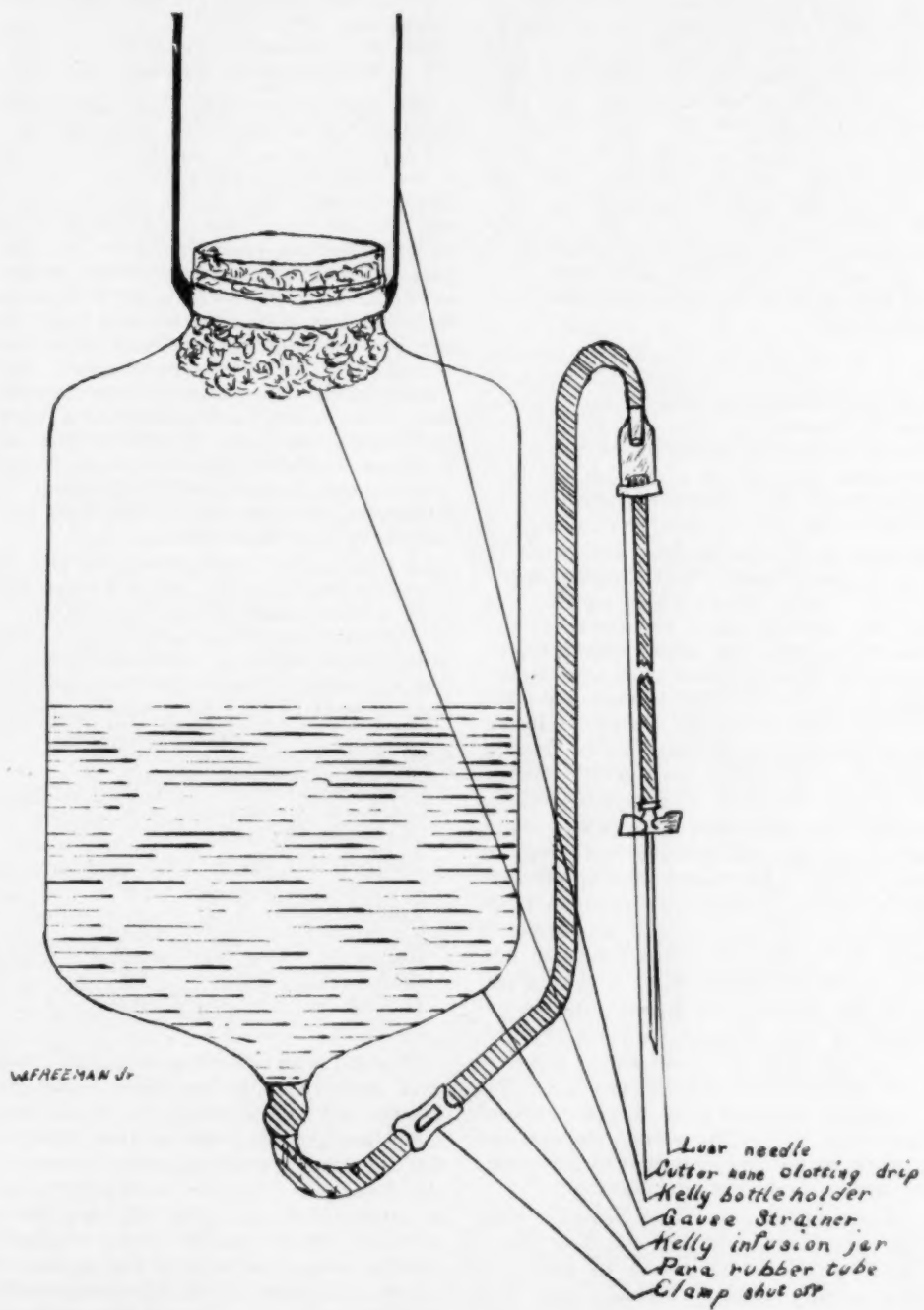


Fig. 2. Kelly infusion jar.

increased vigor. With this returning vigor an operation seemed advisable and was performed that afternoon. The operation was successful although a great deal of blood was lost. Another transfusion was thought advisable, but because a donor was not available, this was not possible. The dog died late that evening.

There is no doubt in my mind that the first blood transfusion was of marked value as shown by the increased blood count and the clinical picture. While there is no certainty that a second blood transfusion would have saved the patient's life, it is conceivable that it would have done no harm and, perhaps, have done much good.

CASE 3.

Spaniel, female, entered 9/17/39.

Diagnosis: toxemia.

Red count (9/18/39): 5,130,000.

White count: 25,500.

Differential: 93 p, 1 l, 1 mon., 6 myel.

Schilling: 17%.

Upon examination the animal was found to be in a comatose state. The mucous membranes were dirty brown. The breath was rancid. She had not eaten or drunk for the past four days. Extreme dehydration with no tonus to skin. The dog had a history of having convulsions three or four times a day. 450 cc. of a 5 per cent saline and dextrose solution was administered subcutaneously in an attempt to replace some of the fluid loss. The following day the animal was still in a depressed state, having had one convulsion. The above count was taken and 300 cc. of blood was given in the hope that it would have some nonspecific stimulating action and also try to combat the dehydrated condition. This did not seem to have any effect. The animal continued to fail, refusing to take either medication or nourishment by the mouth. It lapsed into unconsciousness on the morning of September 19, 1939. An additional 400 cc. of saline and dextrose was administered subcutaneously on this date. Animal succumbed on the morning of September 20, 1939. The owner claimed the body; hence, an autopsy could not be performed to ascertain the cause of the condition.

In this case blood transfusion seemed to have no value except that it was retained longer than saline and dextrose due to its ability to maintain normal osmotic pressure and was, therefore, not lost in the tissues by diffusion.

CASE 4.

Scot. Ter., male, entered 9/23/39.

Diagnosis: anemia.

Hemoglobin: 47.4%.

Red count: 3,530,000.

White count: 8,700.

Differential: 60 p, 30 l, 3 mon., 1 eo., 6 myel.

Schilling: 12%.

9/24/39—transfusion 150 cc.

9/25/39—red count: 4,240,000.

This case had a history of the patient having frequent hemorrhages from the nostrils. For the past two years this patient had been living in the Canal Zone and, while there, this condition developed. The spleen also became swollen. At the Canal Zone a blood examination for piroplasmosis proved negative. It was also negative to intestinal parasites. When we examined the dog, it was languid, temperature 98.5° F., very poor appetite, coat poor, no interest in surroundings, abdomen quite swollen, especially on the left side, and spleen could be readily palpated. Visible mucous membranes were pale, blood count indicated a need for transfusion, which was then given. This seemed to cause a slight improvement as it showed some interest in food and surroundings. A relapse occurred, however, on the third day and the animal died that evening.

In this case we strongly suspect that either piroplasmosis, which we could not demonstrate on a stained smear, or some hemolyzing virus or organism, was the cause of death. While the blood transfusion was of temporary benefit, it was not enough to overcome the rapid destruction of blood by the factor causing death.

CASE 5.

Mong. Spitz, entered 9/27/39.

Diagnosis: distemper.

Red count: 5,110,000.

White count: 30,700.

Differential: 89 p, 7 l, 4 myel.

Schilling: 78%.

Transfusion—120 cc. (direct).

Red count (9/28/39): 6,210,000

White count: 32,300.

Differential: 92 p, 3 l, 5 myel.

Schilling: 87%.

This dog was in serious condition; discharge from both the eyes and nose, emaciated, depressed, not eating. While the blood count was fairly normal for a dog in this condition, we felt that the general symptoms indicated that the chances for recovery were very poor (temperature 103.4° F.). We felt that this would be a good case to test the efficacy of blood transfusions in the treatment of distemper by transfusing the blood of an actively immune dog. The donor was a perfectly normal dog which had recovered from distemper one month earlier and was kept in the distemper ward to keep up active immunity for this purpose. This transfusion did not materially improve or affect the recipient. The discharge did not cease nor did the temperature drop more than 0.4 of

a degree. The dog, thus showing no improvement, was destroyed three days later.

CASE 6.

Boston Ter., male, entered 10/21/39.

Diagnosis: acute anemia.

Red count: 890,000 (average of two counts).

White count: 19,700.

Differential: 74 p, 14 l, 2 eo., 9 myel.

10/22/39—450 cc. citrated blood.

Red count (10/23/39): 4,940,000.

White count: 9,050.

This dog, when presented for examination, was in an extremely weakened condition, able to stand only momentarily before legs would give way. Visible mucous membranes were colorless. Temperature was 99° F. Extremely emaciated and no tone as to skin. Owner gave history of the animal gradually going off feed for the past three weeks, and three days before presentation stopped eating entirely. Also, ulcer of right eye. From physical examination, blood count was thought necessary. Immediately after that a blood transfusion was performed and 450 cc. of citrated blood administered. The animal was able to stand the next day, and was forcibly fed beef broth in the morning, but ate 6 oz. of liver of its own volition in the afternoon. A fecal examination was made which showed a very light trichuriasis. All other examination proved negative. Dog was discharged five days later, apparently normal. Appetite was good and animal was quite lively. It was sent home with eye ointment and whipworm treatment, with instructions to owner to bring animal back for check-up in two weeks.

Brought back by owner with same symptoms as above but in worse condition. Owner requested animal to be destroyed. Autopsy performed and revealed anemia to be due to an overwhelming whipworm infestation which completely covered the intestines from the cecum to the anus. It is difficult to reconcile the fecal report with our autopsy findings, but there is no doubt that the blood transfusion saved the animal's life when first entered, but the drain of the whipworms upon the blood supply caused the recurrence of the condition.

CASE 7.

Ger. Shep., female, 6 years old, entered 11/3/39.

Diagnosis: pyometra.

Red blood count: 3,160,000.

White count: 40,600.

When presented for examination, the animal was in an extremely weakened condition, had a swollen abdomen, a purulent discharge from the vagina, a temperature of 98.4° F., visible mucous membranes were pale, and the dog appeared extremely dehydrated. The owner gave

a history of being ill for the past three weeks, not eating for the past two days and vomiting even after taking small quantities of food or water. Due to the poor condition of the animal, an operation was thought to be inadvisable; therefore, 500 cc. of saline and dextrose was given daily for two days in an attempt to overcome dehydration and improve the general condition. The dog, however, became progressively worse and, after the blood count was taken, a transfusion was decided upon; 375 cc. of whole blood was given (direct) on November 5, 1939. The following day the animal appeared to be much brighter and retained the milk which it took voluntarily. Blood count was taken November 6, 1939, which showed 5,140,000 red blood cells and a white count of 35,750. With this improvement in condition an operation was performed the following day. From then on the dog made an uneventful recovery and was discharged on November 16, 1939.

We feel that blood transfusion was of definite value in this case, since it not only improved the general condition of the patient, by combating anemia and dehydration, but turned a poor surgical risk into a good one.

CASE 8.

WHFT male, 1 year old, entered 1/15/40.

Diagnosis: gastritis, malnutrition, anemia.

Red blood count: 3,360,000.

White count: 30,750.

2/19/40—250 cc. of blood given.

Red blood count (2/21/40): 7,510,000.

White count not taken.

This animal, when presented, was very emaciated and in extremely poor general condition. The temperature was 101.5° F., mucous membranes were pale, the dog was languid, had a history of vomiting frequently; the appetite was variable but usually poor. This dog was fed dried and canned dog foods almost exclusively. Treatment consisted of a thorough internal cleaning with olgar, vita-king twice daily, liquid diet of milk and beef broth first two days, then milk in the morning, and meat in the evening. The animal showed slow improvement and it was taken home four days after admission. The owner was given instructions as to diet, and a vitamin tonic was prescribed. The animal, while seeming much livelier in spirits and not vomiting, was not entirely cured. With the proper diet we thought the anemia would be taken care of. The owner brought the animal back February 19, 1940, saying that it had never regained its normal health, its appetite was poor, it was still languid and the general appearance was poor. Visible mucous membranes were still pale. Blood count was taken showing a red blood count of 3,240,000. Blood transfusion was decided upon. 300 cc. of whole blood administered (direct). Next day the dog appeared

somewhat brighter, color good, appetite also good. February 21, 1940, blood count was taken showing 7,510,000 red blood cells. The animal was discharged that afternoon. Six weeks later, animal brought in for check-up; weight had increased 5 lb., general appearance good, dog lively and appeared normal in all respects. The owner had been following the diet prescribed. Blood transfusion in this case, I believe, was of definite value as it overcame the anemia and allowed body functions to proceed normally.

CASE 9.

Airedale, male, 9 months old, entered 2/6/40.
Diagnosis: distemper.

The dog, when presented, had been ill for 2½ weeks, discharging profusely from eyes and nose, not eating, dehydrated, and very much depressed. From February 6 to February 12, 1940, received 500 cc. of saline and dextrose (5%) per day during which time he would take no food. Condition became critical and, as a last resort, 400 cc. of citrated blood was given on February 13. Appeared much brighter following the transfusion and drank beef broth the next morning. The animal, which up until this time was unable to stand, was now able to do so. No appetite that afternoon, and 250 cc. of citrated blood was given. Food left in the cage that night was eaten by the following morning. From then on until discharged the animal made a steady recovery. Was in excellent condition when discharged.

CASE 10.

Mong. Setter, male, 1 year old, entered 2/20/40.

Diagnosis: distemper, pneumonia.
Red blood count: 4,500,000.

When presented, had been sick for approximately two weeks, temperature 104.1° F., discharging from eyes and nose, rales quite pronounced, breathing in a labored and painful manner. Appetite was very poor, and the dog was force-fed from the date of admittance until February 26, when 350 cc. of saline and dextrose (5%) was given to combat dehydration and developing acidosis. This, along with forced feeding, was continued daily until March 4, during which time the patient became progressively worse. Blood was noted in the stool at this time. Blood transfusion was decided upon as a last resort, and 400 cc. of citrated blood was given. The dog drank milk for the first time the following morning of its own accord, and from then on showed a progressive recovery, appetite being consistently good, along with general improvement in condition. It was discharged March 18 in excellent condition.

In both the above cases we believe that blood transfusion was of definite value, as it was used as a last resort and there was a marked

improvement in both cases. This may have been due to immunity factors which may have been present in the transfused blood, thus allowing the patient to be tided over this crucial period until it was able to overcome the infection.

CASE 11.

Chow, Male, 14 years old, entered 3/4/40.
Diagnosis: shock, internal hemorrhages.

Upon admission, animal was in state of collapse, from combined effects of shock and internal hemorrhages, result of having been struck by automobile. Physical examination failed to reveal evidence of fracture or any other external injuries. Membranes appeared very pale. 500 cc. of isotonic saline and dextrose solution was administered subcutaneously. Dog placed in kennel with hot water bottles. At 10:00 p. m., same evening, animal stood up and appeared much brighter. Improvement continued until 3:00 p. m. the following day, when a state of collapse occurred. 300 cc. of blood was transfused. Slight improvement shown that day and marked improvement the following day, March 6, 1940. From then on, recovery was uneventful and dog was discharged on March 16, 1940.

While saline and dextrose, in this case, was of definite value, its effect was only transitory, as shown by the recurrence of the state of collapse. In contrast, the blood transfused was not lost, but the fluid bulk was maintained, thus preventing another relapse.

CASE 12.

Irish Terrier, male, 1½ years old, entered 3/7/40.

Diagnosis: anemia.
Red blood count: 1,140,000 on admission.
3/7/40: transfusion 300 cc. (indirect).
Red count 3/8/40: 5,550,000.

This dog, when presented for examination, was comatose, the breathing was rapid and shallow, visible mucous membranes were blanched, temperature 98.7° F. Owner gave history of animal being sickly for past month and a half; acutely so, however, for the past six days, taking no food and little water during this time. Animal extremely thin and dehydrated. After the blood count was taken, 300 cc. of blood was transfused. The next morning the dog was much improved, being able to stand, drank two cups of milk in the morning and ate 6 oz. of raw beef that afternoon. Ate regular meal the following morning and appeared to be nearly normal at this time. For unknown reasons, owner ordered animal destroyed that afternoon. Autopsy performed with negative findings.

Blood transfusion, in this case, was of definite value as shown by rapid recovery. The cause of the anemia, while undetermined, was

definitely combated. In our opinion, the animal would have recovered.

CASE 13.

Cocker Spaniel, male, 5 months old, entered 3/12/40.

Diagnosis: shock, luxation of left coxofemoral joint.

Upon admission, the animal was in a state of shock and almost complete collapse. It had fallen from the third floor of a dwelling to street level. Physical examination revealed a luxation of the left coxofemoral joint. Mucous membranes very anemic. 200 cc. of blood was transfused. Color returned to membranes. The next morning the animal appeared very bright, and it was completely anesthetized with nembutal so that the luxated hip could be reduced. Recovery uneventful. Discharged March 21, 1940.

We feel that the blood transfusion was of definite value in this case because it returned the circulation to normal and maintained the fluid bulk, thus making the animal a good surgical risk the following day.

CASE 14.

Cocker Spaniel, female, 7 months old, entered 3/13/40.

Diagnosis: lacerated artery in metacarpal region.

Upon admittance, the animal was bleeding profusely and the mucous membranes were blanched. Nembutal was given in order to suture the wound. Under the anesthetic respiration was stopped and the heart beat was imperceptible. 80 cc. citrated blood was given immediately along with intracardiac adrenalin. Heart beat became immediately perceptible and normal respiration recurred. From then on the animal made a nice recovery and was discharged two days later.

In this case, the cessation of respiration and heart beat was no doubt due to circulatory failure brought about by the rapid depletion of blood volume caused by gross hemorrhage. The transfused blood helped to restore blood volume which, with the adrenalin, allowed the circulatory system to function in a near-normal manner.

CASE 15.

WHFT, male, 6 years old, entered 3/19/40.

Diagnosis: severe anemia, suspect new growth on spleen.

Red blood count: 2,340,000.

White count: 50,000.

3/19/40: transfusion of 250 cc. blood.

3/20/40: red blood count, 4,380,000; white count, 42,250.

3/20/40: 250 cc. more blood given. No count taken.

When presented for examination, the animal

was in a depressed state, being unable to stand and taking little notice of its surroundings. The visible mucous membranes were quite pale. The abdomen was swollen and firm. Enlargement could be felt on left side in vicinity of spleen.

An exploratory laparotomy was decided upon, a blood count was taken, and 250 cc. of blood administered. The following morning the animal was able to stand and walk, and showed interest in its surroundings. It did not appear strong enough, however, to undergo the operation and, therefore, another 200 cc. of whole blood was administered. About ten minutes after the second transfusion the animal appeared nauseated and vomited and breathed heavily for approximately ten minutes, after which he appeared slightly weaker than before the second transfusion. The color, however, was good. He was operated upon that afternoon. A tumor was found upon the spleen and it also involved the mesentery and duodenum. This tumor was quite vascular and large. There was much blood in the abdominal cavity. The involvement was so large that the animal was destroyed. He withstood the operation very well, however.

The blood transfusion was valuable in this case because it turned a poor surgical risk into a fairly good one. I also believe that the nausea and vomiting, which we noted after the second transfusion, was due to overtaking the vascular system as too much blood was given in too short a period.

CASE 16.

Chow female, 8 years old, entered 3/20/40.

Diagnosis: laceration of ventral surface of tongue.

Animal, when presented, was bleeding slowly but constantly from the mouth. Had history of doing so for the last two days. General condition seemed fairly good. Mucous membranes were nearly normal. A blood count was taken which showed a count of 3,500,000 red blood cells. 225 cc. of citrated blood was administered, and two hours later, animal was placed under nembutal. Wound was sutured and animal discharged the following day.

In this case, while the count of red blood cells was not extremely low, we felt that due to the constant loss of blood it would be advisable to give a transfusion in order to lessen the operative risk.

CASE 17.

Mong. St. Bernard, male, 1 year old, entered 3/23/40.

Diagnosis: shock, internal hemorrhage, laceration of left stifle, multiple bruises.

Upon admission, the animal was in a state of collapse, breathing was heavy, visible mucous membranes extremely pale, bleeding freely from

cut vessels in region of stifle. When moved a very bloody urine was discharged. 450 cc. of blood was administered while bleeding vessels were being ligated. Extremities were cold. It was then placed in a cage surrounded by hot-water bottles. Five hours later the animal was able to stand, although it was somewhat weak and would not take food that evening. Next day it appeared much brighter. From then on, recovery was uneventful. Discharged March 27, 1940.

Blood transfusion in this case was definitely indicated since circulatory collapse was imminent, due to blood loss externally and that loss from the internal injuries. With the return of circulation to normal, due to the influx of transfused blood, threatened circulatory collapse was overcome.

CASE 18.

Cocker Spaniel, female, 3½ years old, entered 3/31/40.

Diagnosis: pediculosis.

Red count: 1,890,000.

The dog, when presented for examination, was in an extremely weakened condition, able to stand only with difficulty; visible mucous membranes were blanched and, upon examination, the body was found to be heavily infested with lice (*Linognathus piliferus*). The owner gave a history of the animal becoming progressively weaker with a general loss of appetite. This can be well appreciated by noting the above blood count. The dog was immediately given a blood transfusion of 325 cc. of citrated blood, and then dusted with an insecticide in order to kill the lice. Eight hours later marked improvement was shown in that it was able to stand almost normally, the color was good, and it drank some beef broth. On April 1, 1940, the red cell count was 4,920,000. The patient appeared almost normal and had a hearty appetite. It was given a de-lousing bath that afternoon and was discharged on April 5, 1940.

Blood transfusion in this case was of value since it immediately overcame the extreme anemia and allowed the patient to make a complete recovery in a remarkably short time.

CASE 19.

Collie male, 15 years old, entered 4/6/40.

Diagnosis: laceration of forehead, internal injuries, shock.

This dog, when admitted, was in quite a depressed state, having suffered a laceration of the forehead and general bruising due to a fight. The animal was given 300 cc. of saline and dextrose (5%) and wound sutured under local anesthetic. Appeared to be much brighter the following day. On the afternoon of April 8, he again seemed quite depressed, at which time 500 cc. of saline and dextrose was given. This seemed to be of temporary benefit, but late next morning the condition again became seri-

ous. An additional 500 cc. of saline and dextrose was administered. There seemed to be very little response to this treatment. On the following morning (April 10), 300 cc. of citrated blood was transferred. The animal appeared to be somewhat improved that afternoon and started to eat the following day. Recovery was slow but constant from then on until his release on April 17, 1940.

We feel that blood transfusion in this case was of value as it counteracted the dehydration in a more permanent manner than the saline and dextrose which was of a transitory value. In addition, blood seemed to have definite tonic and stimulating effect, carrying him over the crucial period.

CASE 20.

Irish Terrier, male, 7 months old, entered 4/11/40.

Diagnosis: concussion of brain, internal injuries and hemorrhage.

Upon admittance, the animal was in a comatose state, eyes were dilated, no reflexes, mucous membranes were blanched, breathing slow and shallow, blood from penis and anus. Blood transfusion immediately given (300 cc.) direct. Color of visible mucous membranes improved almost immediately. Breathing gradually became better. Twelve hours later, animal began to show signs of returning consciousness. Fully conscious next morning. Able to stand with some difficulty. Able to eat that afternoon. From then on, recovery was rapid and the dog was released on April 14, 1940.

The indication for blood transfusion in this case was due not only to shock, but also to blood loss due to internal hemorrhage. We feel blood transfusion was of value in this case, since it not only immediately restored blood volume, but the restoration was not of a transitory nature.

COMMENT

At the first glance, the above-mentioned results may not seem encouraging, but it must be kept in mind that these cases were not a selected group—that they all were dangerously ill or dying when admitted for treatment.

American farms represent an investment of 63 billion dollars and they annually produce commodities valued at 10 billion dollars. The farming industry is far above any other industry in capital investment and annual production. Moreover, the products of the farms are the fundamental essentials of life, among which are food and clothing.

SURGERY & OBSTETRICS

AND PROBLEMS OF BREEDING

Hygroma of the Bovine Carpus

T. H. FERGUSON, V.S.

Lake Geneva, Wis.

HYGROMA is frequently encountered in stabled cattle. It may be a sequel to a sudden, direct injury, but it is more commonly caused from constantly striking the knee against the feed trough or floor when rising. Sometimes in stretching to get food beyond its reach the animal slips to its knees and is injured. More cases develop during a winter following a drouth when bedding is scarce and the animals have to lie on bare floors. When hygroma occurs among pastured cattle, it is always due to a sudden, direct injury.

HYGROMAS CLASSIFIED

The following is a fairly satisfactory classification for the more common hygromas: (1) an acute bursitis which is not commonly noticed; (2) a chronic, serous bursitis or typical hygroma; (3) a suppurating swelling due to infection of the injured part; and (4) a diffuse, fibrous enlargement.

In handling any hygroma, the first important consideration is to prevent further injury. If this is not done, treatment is useless. A good place for an afflicted animal before treatment, as well as after, is a stall that has been covered with dirt arranged in such a manner as not to spread. The dirt, in turn, should be covered with ample bedding. If the animal is kept in a stanchion, the stanchion support should be padded to prevent further injury. An ideal confinement after operation is a box stall prepared in the above way.

TREATMENT

Acute bursitis, which is manifested by pain, heat and swelling of the part, usually

responds promptly to the following treatment. Apply ice for six hours. To handle the ice conveniently, use an automobile inner tube. Stretch the tube over the leg and bandage tightly from the foot to the middle of the metacarpus, providing an opening for the claws. Pack the inner tube to just above the knee with crushed ice. Support the bandage over the animal's neck and withers and around the other leg. Follow the six hours of ice treatment with six hours of treatment with hot applications. This can be accomplished by wrapping several thicknesses of absorbent cotton around the knee, holding in position with bandages, pulling the inner tube back into position, and applying hot water.

Follow this hot treatment by the application of 1 dr. each of oil of organum and oil of cedar, 0.5 oz. of iodine crystals and 1 pt. of wood alcohol. Apply to the affected parts with a brush twice daily until the skin shows soreness. Discontinue until the condition of the skin is normal. If slight swelling remains, repeat the medication.

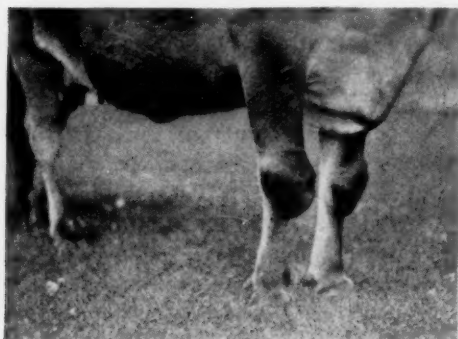
It is fortunate when hygroma is noticed in the stage of acute bursitis, for that is the best time to treat the condition.

When the condition has progressed to the stage of a chronic, serous bursitis or typical hygroma, there are several methods of treatment from which good to fair results may be expected. In purebred animals, or in others where the expense and bother are not taken into consideration, a flap operation may be performed, and the sac removed by dissection. After dissection is complete and hemorrhage is controlled, the judicious trimming and suturing of the flap make a

very satisfactory finish, providing that the leg was properly prepared for the operation, the operation performed under aseptic conditions, and the knee joint completely immobilized after the operation and until healing was complete.

OPERATIVE PROCEDURES

To prepare the leg for the operation, clip it and shave over the entire swelling. Scrub thoroughly with soap and water. Follow with alcohol thoroughly rubbed into the



—Courtesy University of Minnesota.

Big knees of cattle often are associated with *Brucella abortus* infection.

skin. Bandage with absorbent cotton and gauze bandages from the foot to well above the knee. Cover this with an inner tube, supported over the neck to the other leg, and keep the bandage soaked for 24 hours with a 1:1,000 solution of bichloride of mercury.

Our operative technic is as follows: Restrain the cow with the affected leg uppermost. In some cases, it is well to strap the leg to a 2 x 4 or a smooth board after applying a tourniquet above the knee. Anesthetize with chloroform. For a medium-size swelling, one flap is sufficient. Make the flap on the inside, cut through the skin, dissect out the flap and suture it to the outside of the leg. This gets the flap out of the way.

Dissect out the sac, ligating the larger vessels, cauterizing the smaller ones, until the entire sac or fibrous growth is removed *en masse*. Trim the flap, but leave sufficient skin so that there will be no tension

on the suture. It is much better to have too much flap than too little; nature seems to take care of the extra skin.

After the flap is sutured in position, dress the parts with etherized iodoform and a liberal supply of powdered boric acid. Cover with absorbent cotton and bandage with gauze bandage. Apply a metal splint cut to conform with the shape of the leg and concave to fit. Apply a splint front and back. Fasten with rope or bandage. This dressing should be removed in three days, at which time, if the condition of the wound is favorable, etherized iodoform and boric acid powder should be administered liberally, followed by the application of a plaster of paris cast from the hoof of the middle third of the radius. Do not cover the claws. To enhance the hardening of the cast, use about 10 per cent powdered alum. This kind of cast hardens quickly.

If the case progresses favorably, leave the cast on for three weeks, by the end of which the wound should be fairly well healed. If the animal is kept in a stall, it should be well bedded to prevent injury to the other knee, which will have to be used exclusively in getting up. Should both knees be affected (see accompanying photograph), operate the larger hygroma first, and after it has healed, the other may be operated.

Another operation that we have used successfully for this condition is as follows. Either prepare the growth as described above, or clip the hair and apply tincture of iodine. Puncture the growth at the superior surface, or in several places if it is honeycombed. Remove all fluid possible and carefully inject formalin. It may be necessary to tap in two or more places. In tapping, it is better to introduce the trocar obliquely, as this procedure forms a valve which tends to keep the gas in. In about ten to twelve days, the entire sac will be loosened and may be removed from an incision on either side. Under this method, hemorrhage is not severe. It also leaves a nice bed of granulations, and the wound will, if sutured and the leg immobilized, heal satisfactorily. The sac may be removed in its entirety or, if a smaller inci-

sion is desired, it may be divided and removed in parts. Immobilize the leg either with splints or a cast to be left on until healing takes place unless contraindications develop.

A third method for handling a typical hygroma, especially of the serous type, is to prepare the enlargement, thread a seton needle with the end of a 4-in., 10-yd. bandage. Restrain the animal and leg, thrust the needle through the bunch from inside out at about the middle of its lower third. Unroll a sufficient amount of the bandage to pack the cavity. Saturate this with tincture of iodine and thoroughly pack the cavity. Use the balance of the bandage to circumscribe the swelling and leg. Since there is always considerable hemorrhage in these cases, it is well to apply a tourniquet well above the knee. The tourniquet can be removed just after bandaging. In severe cases, the bandage should be cut and removed in 48 hours, leaving enough of it to make a seton.

The interior should be loosely packed with iodine gauze for seven days. If such a sac is complicated, with fibrous bands or growths, they should be removed with a curette or scissors. If circumstances permit, the leg should be immobilized with splints or a cast; if not, the animal should be kept in the pasture or in a stall with a dirt bottom and plenty of bedding. With just ordinary attention, animals will make a fair recovery under this procedure of treatment.

Abscessed hygromas should be handled in much the same way. In cases where the growth assumes the size of a water pail—unless the animal has extraordinary value—and in cases where the joint proper is affected, the animal should be slaughtered.

"Horse dentistry," says *Successful Farming*, "will often change a gaunt, hay-rack type of horse into a sleek, well-conditioned animal. Sound teeth also mean less risk from colic and indigestion."

Esophageal Choke in a Dog*

FAUSTINO S. MENSALVAS, D.V.M.

Pandacan, Manila

THE TERM CHOKE, as commonly understood, refers to strangulation, stifling, throttling, suffocation or smothering. Among veterinarians, however, it connotes an obstruction of the esophagus brought about by the presence of a foreign body in its lumen,

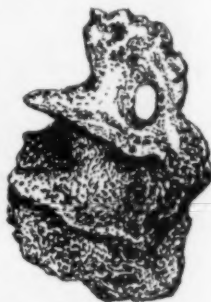


Fig. 1. Sketch of the foreign body, postero-medial view. (Scale, 1:1.)

thus rendering deglutition difficult and painful or entirely impossible.

This is not an uncommon condition among dogs, especially puppies or young dogs that are fed in groups, owing to their habit of hasty gulping or swallowing. The foreign body may be lodged in any portion



Fig. 2. Sketch of the foreign body, antero-lateral view. (Scale, 1:1.)

of the esophagus, although more often in certain parts, such as at the thoracic inlet due to its compression at this region by the trachea and the first rib, at its cardiac end due to its caliber being smallest at this point, or immediately behind the pharynx.

A great variety of foreign bodies have been found causing esophageal obstruction.

*From the College of Veterinary Science, University of the Philippines.

The most common ones are pieces of bones, cartilages, tendons, needles, safety pins, meat skewers, hard food masses, stones, rubber balls, buttons, corks, glass and pieces of wood. In the veterinary hospital of the College of Veterinary Science, University of the Philippines, a case of choke, which is the subject of this report, was

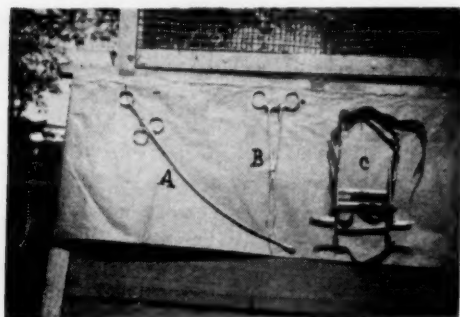


Fig. 3. Instruments used in removal of the foreign body. (A) Canine spiral throat probang, (B) vulsellum forceps, (C) canine mouth speculum.

caused by a thoracic vertebra of a pig. (See figures 1 and 2.)

REPORT OF CASE

Subject.—Grade Bulldog, male, brindle, age 4 months, weight 10 lb.

History.—Four days before the dog was presented to the clinic (January 20, 1941) there was vomiting, complete loss of appetite and profuse salivation. The day following the onset of illness he was taken to a private veterinary hospital, where the condition was diagnosed as a case of choke. For unknown reasons, no treatment was given. The condition of the animal became very much aggravated two days afterward. Besides those symptoms previously shown, weakness and emaciation became apparent. He was brought to the College clinic on January 24, 1941.

Symptoms.—The dog was emaciated and very much depressed, had an anxious expression and preferred recumbency on account of weakness. There was drooling of saliva from the commissures of the mouth which caused soiling and matting of the hair of the lower jaw and the front legs. Swallowing movements were mani-

festated with difficulty. Close examination disclosed slightly congested visible mucous membranes, elevated temperature (39.6°C .), and normal pulse and respiratory rates. The neck was swollen due to a hypertrophy of the thyroid glands (goiter) and there was pain on palpation, especially at the base. Vomition was noted and the presence of a foreign body in the esophagus at the thoracic inlet was felt.

Diagnosis.—Foreign body in the esophagus. The presence of goiter made palpation difficult; therefore, a definite diagnosis was not made until after a thorough examination.

Treatment.—On the first day, due to the absence of a definite diagnosis, a mixture of equal parts of digestive tonic and milk of bismuth (4 cc.) was given. This was taken with difficulty. The next morning, weakness being marked, hypodermoclysis



Fig. 4. The dog after complete recovery.

of 5 per cent serum glucose (125 cc.) was given. In the afternoon of the same day, the case having already been diagnosed, the canine mouth speculum was applied and extraction was attempted by the use of a canine spiral throat probang (fig. 3). This caused lacerations of the mucous membrane of the esophagus as shown by the presence of blood mixed with mucus after the withdrawal of the instrument. This being unsuccessful after several attempts, the dog

was given rest until the following day, when the procedure was repeated. This time the foreign body was brought close to the pharynx, and by grasping it with a vulsellum forceps (fig. 3), the foreign body, a thoracic vertebra of a pig (one half minus the spinous process) 2.6 cm. long (measured from before backward), 3.7 cm. wide (measured from above downward) and 1.4 cm. thick was extracted (figs. 1 and 2). No food was given this day. Feeding twice a day with cold milk was started the next day and potassium permanganate enema (1 to 1,000 solution) was given daily thereafter.

Observations.—Immediately after the removal of the foreign body, the dog was very much relieved. He had a good appetite the following day and appeared lively. Salivation was no longer observed, nor was there any vomition. Recovery was complete five days later (fig. 4).

Pyloric Stenosis in a Fox Terrier

The patient was a Fox Terrier bitch, 7 years old, with a history of lifelong good health and a good eater until six months ago, when she suffered frequent spells of vomiting. For two weeks previous to the examination she vomited more frequently, swallowed constantly and gasped for air. She was dehydrated, thirsty, restless and considerably underweight. The epigastrium was distended.

Foreign body was excluded by x-ray examinations. The fluoroscope and plates showed only distention of the stomach. Although an exploratory operation was recommended, the owner delayed his decision too long.

The autopsy revealed a stomach greatly engorged with air and some meat eaten the night before, and complete closure of the pyloric orifice. The two sphincters of the pylorus which are normally separated by a strip of thinner wall were folded upon each other and extended into the narrow part of the orifice.

The operation employed for pylorospasm would have been performed. It consists of separating the thickened or probably in-

flamed musculature by means of several incisions down to, but not including, the mucous membrane.—*Leon Roth, D.V.M., Chelsea Dog and Cat Hospital, New York, N. Y.*

Bone Surgery in Small Animals*

J. E. GREENE, D.V.M., M.S.

Auburn, Ala.

OUR RESULTS in bone surgery have not all been successful. However, unfavorable results were due to faulty technic rather than to the principle involved.

Since our experience in bone surgery has been limited to the application of Lane's steel bone plates, the technic involved in the application of these plates is briefly outlined as follows:

The site of fracture is exposed as for any of the technics of repair, with exceptional care taken to insure absolute asepsis because the transplanting of foreign materials presents unusual hazards. The operation should always be performed with gloves and even the gloved fingers should be kept out of the wound as much as possible. The plates are handled with instruments which should be resterilized after being handled. The drill bits are sterilized and the electric drill, wrapped in a sterile towel, is handed to the operator by an assistant. Bone fragments are handled as carefully and as little as possible and the periosteum is preserved. Never strip the periosteum away from the bone. Plates used are of a high grade vanadium or vitalium steel of different sizes and shapes with screw holes variously disposed. The screws, of the same material, are threaded to the head and are of a suitable length. They should not ordinarily be placed nearer than one-fourth inch to the fracture. However, we have had satisfactory results when they were necessarily placed nearer. The bones and bone plates may be handled with Allis tissue forceps.

Repair of simple fracture of the rami of

*Read before the annual meeting of the Southern Veterinary Medical Association, Birmingham, Ala., November 13-15, 1940.

the mandible.—The bone ends are exposed by retracting the gum downward from the alveolar border so as to expose an area sufficiently large to accommodate the plate selected. Care should be taken to avoid injury to the external maxillary artery, external maxillary vein, and Steno's duct. Place the plate in position over the fracture, align the bone ends and clamp the plate in position with the tissue forceps. After the holes in the bone are begun with the drill, the screws are set in place and tightened with an Allen screw driver. The retracted gum is sutured back in place. The plate is allowed to remain from three to five weeks. In the meantime the animal may be fed normally.

Repair of fracture at the symphysis of the mandible.—With the lower lip held out of the field of operation by forceps (a towel clamp may be used), set the two parts in apposition and either have an assistant hold them or fix them with an intestinal clamp. Drill a hole straight through the gums and both parts of the mandible from side to side low enough to avoid injury to the roots of the incisor teeth. Insert a bicycle spoke, threaded on one end and with a washer, soldered on the other end, which has been cut short enough to leave about one-fourth inch extending on the threaded end. Apply a small washer and screw nipple on the threaded side. The nipple should be ground down to one-fourth inch length and well rounded. It may be locked in place by crushing it with a pair of pliers after adjustment. The after-treatment is negligible and the animal may be returned to its owner the next day. Remove the spoke in three to five weeks, depending upon the age of the animal.

Repair of ruptured tendon.—Tendons that are completely or incompletely divided are fairly common in both dogs and cats. Because of the weight borne and the leverage of the joint, the tendon of the gastrocnemius and that of the superficial digital flexor are usually involved.

We have had occasion to repair tendons on both the dog and cat. The animals when entered into the clinic were walking on the

tarsus like a rabbit but exhibiting no pain. The same technic was used in each with equally good results.

The skin incision is made over the area on the posterior surface of the leg just above the hock. Bring the tendon of the gastrocnemius to the surface (have an assistant keep the leg flexed to facilitate this). If this tendon is intact dissect down to the superficial digital flexor tendon, preferably with scissors, taking care to avoid injury to the posterior and recurrent tibial vessels. It is usually necessary to divide the two heads of the gastrocnemius to expose the superficial digital flexor.

When the two ends of the tendon are found they are usually somewhat shredded and one to three inches apart. After removing the abraded ends of the tendons, bring them together by a combination marginal mattress suture of silkworm gut, kangaroo tendon or artificial silkworm gut. The wound should then be closed and covered with collodion. The leg should be held in flexion by a splint from four to six weeks, depending upon the age of the animal.

There is no connection between the incidence of Bang's disease and mastitis.—*Case.*

Three and a half oz. of dry skim milk mixed with $3\frac{3}{4}$ cups of water has approximately the dietary value of a quart of skim milk. By adding to this $1\frac{1}{2}$ oz. of butter, one has approximately the same food value as a quart of fluid whole milk.—*Consumers' Guide, USDA.*

Producing eggs of good appearance, outside and inside, and of good flavor is emphasized as the first step for increasing egg consumption. Onions, garlic, turnips, leeks and almost any weed obnoxious to the taste impart undesirable flavors to eggs. More than 5 per cent of cottonseed meal tends to make the yolk mottled and the white pinkish after storage. Cod liver oil and sardine oil have no harmful effect.—*USDA.*

CLINICAL DATA

An Atypical Type of *H. Gallinarum* (Infectious Coryza) Infection in Chickens*

J. P. DELAPLANE, D.V.M., and H. O. STUART, M.S.

Kingston, R. I.

SINCE 1932, the writers have studied the type of infectious coryza produced by the organism *Haemophilus gallinarum*. In practically all of the field cases of this infection, as well as that produced in the laboratory, the disease has been characterized by involvement of the upper respiratory tract. This type of infection can often be distinguished by clinical examination, and can be confirmed by bacteriologic methods. Briefly, this type of the disease is characterized by nasal exudate and edematous swellings of the face and sometimes the wattles. Two exceptions have been noted with respect to this common disease picture. In one there has been a combination of involvement of the upper and lower respiratory tract, in which instance two distinct diseases were suspected, but upon further study were found to be due to a type of *H. gallinarum* capable of invading both the upper and lower respiratory tracts. The other exception was noticed recently; the disease outbreak was of a type where the major involvement affected the trachea and lungs and, to a less appreciable extent, the upper respiratory tract.

Since the clinical symptoms and post-mortem findings produced by *H. gallinarum* infection of the latter type may be easily confused with other respiratory infections of chickens (particularly infectious bronchitis), it seems advisable to describe the latter type of the disease.

CASE REPORT

Six live specimens from a flock were submitted to the laboratory with the following history: The birds had been vaccinated for laryngotracheitis and fowl pox several weeks prior to the development of any trouble, and this particular respiratory disease had been noted for approximately one week. The disease first occurred in an older group of 1,500 Rhode Island Red birds on range, and apparently had not seriously affected them except for some diminution in food consumption.

Among a group of younger birds (approximately 9 weeks old) the birds had lost weight, and some 50 out of 300 died in the last few days prior to bringing the birds to the laboratory. All of the latter group, as reported by the owner, were listless and droopy, and losing body weight. The respiratory symptoms noted and reported by the owner were coughing and wattled breathing, and some but not all of the birds showed a nasal exudate. When the owner was questioned as to whether any swelling had been noted about the heads of the birds, he stated that only a couple had shown swellings.

The writers suspected, from the symptoms displayed by the birds, that the disease was infectious bronchitis complicated with some other trouble inasmuch as the birds were losing weight and there was a rather high mortality.

The autopsy findings failed to indicate that coccidiosis or other parasites were involved in bringing about the loss in weight.

*Contribution No. 581 of the Rhode Island Agricultural Experiment Station.

One of the six birds showed a fibrinous pericarditis in addition to the catarrhal and mucous exudate in the trachea and involvement of the lungs characterized by congestion and edema and catarrhal exudate in the bronchi. The other birds showed only the involvement of the lower respiratory tract and a mild coryza.

It has been our experience that infectious bronchitis does not cause any mortality in birds of this age. Although the clinical symptoms, the rapidity of spread and the postmortem findings were not distinguishable from infectious bronchitis, a diagnosis was not given.

Exudate from the trachea of the birds was used to inoculate three susceptible laboratory birds in the nasal passages and trachea. Within 20 hours, the three laboratory birds exhibited marked facial swellings and symptoms of a lower respiratory tract infection. One of these birds was killed, and the edematous swellings cultured in a manner already described by the authors.¹ The blood cultures examined by staining at the end of 24 hours failed to show any organisms, but a fresh transfer made at this time showed a growth typical of *H. gallinarum* at the end of 24 hours.

This type of *H. gallinarum* infection was unusual and, therefore, the writers visited the premises to observe the birds in order to note whether any birds were showing the more typical symptoms of the upper respiratory tract, particularly swellings, but none of the birds observed showed these symptoms.

The organism isolated from this outbreak seemed to be more virulent than usual, and the laboratory birds inoculated intranasally with it showed whitish, cheesy patches in the mouth in addition to the swelling of the face and nasal discharge. These false membranes were not noted in the field cases, but did occur in those birds inoculated with the tracheal exudate of the field cases. This is the first time that such

lesions have been found associated with this infection.

DISCUSSION AND SUMMARY

This case report calls attention to a type of clinical *Haemophilus gallinarum* infection differing from that ordinarily observed and described. It also emphasizes the value of inoculating susceptible birds and of bacteriologic methods in the diagnosis of respiratory diseases of chickens, because, in this instance, the inoculation of the suspected exudate in the nasal passages brought about the typical picture of *H. gallinarum* infection as it affects the upper respiratory tract, in contrast to the fact that had the suspected exudate consisted of infectious bronchitis virus, such reactions would not have been observed. In the latter disease, a coryza may appear several days following inoculation, but facial swellings have not been observed to occur with this virus except in baby chicks.

The whitish, cheesy diphtheritic lesions in the mouth are the first the writers have ever recognized as occurring as the result of *H. gallinarum* infection. This also constitutes another causative entity for the "canker-like" lesions which we sometimes see in the mouths of chickens.

Farm Incomes

The estimated total cash income of American farmers in 1940 was \$9,094,000,000—an increase of \$576,000,000 over 1939. Benefit payments for 1939 fell from \$807,000,000 to \$766,000,000 for 1940.

Excluding the benefit payments, livestock brought farmers \$4,824,000,000 in 1940 and crops \$3,504,000,000 in 1939. Broken down to special items, the figures show:

	1939	1940
Grains	\$878,000,000	\$995,000,000
Cotton and seed. .	677,000,000	609,000,000
Fruits	413,000,000	426,000,000
Vegetables	582,000,000	625,000,000
Eggs and poultry .	722,000,000	748,000,000
Tobacco	264,000,000	241,000,000

The income from dairy products rose from \$1,355,000,000 to \$1,502,000,000; but that from meat animals dropped from \$2,262,000,000 to \$2,149,000,000.

Experts of the USDA predict that the income for 1941 will be \$600,000,000 higher than that of 1940.

¹Delaplane, J. P., Erwin, L. E., and Stuart, H. O.: The isolation of a hemophilic bacillus in pure culture and the reaction of chickens to extranasal inoculations thereof. J. Agr. Res., III (1936), pp. 377-383.

A Practitioner's Method of Mastitis Control

CHAS. H. HAASJES, D.V.M.

Shelby, Mich.

1) *Classify the Cows.*—The milking cows are grouped into three classes: the clean group, the suspicious group and the badly infected group.

2) *Use of the Strip Cup.*—When a cow shows watery milk, flakes, clots or pus repeatedly, she should be removed from the milking line, particularly if from a clean group. Early discovery of watery milk or pin-point flakes often saves a cow, if the grain ration is reduced and the affected quarter or quarters are milked out hourly and hot packs applied.

3) *Washing Udders.*—An individual towel is furnished for each cow. The towels are soaked in chlorine solution, 200 parts per million. The milker removes the towel from the pail and wrings it partly dry. After the udder is washed with it, the towel is wrung very dry and used to wipe the udder as dry as possible. The towel is then thrown into the discard pail. All of the cows are treated in the same way. Before the towels are used again they are sterilized.

4) *Milking.*—It is a good plan to have each man milk the same cows each time. Because it is important to milk out completely, the herdsman should see that this is done by making frequent checks.

5) *Dipping the Teats After Milking.*—Provide a basin of glass, granite, enamel or porcelain large enough to accommodate all of the four teats at the time. Only 0.5 to 1 pt. of chlorine solution is needed. The strength should be 200 parts per million. The teats of 20 to 30 cows may be dipped with the same solution.

6) *Washing the Hands.*—The milker rinses his hands in chlorine solution 100 to 200 parts per million and wipes them dry, preferably with a paper towel. Wet-hand milking should be prohibited.

7) Do not milk on the floor.

8) *Disinfecting the Platform.*—Remove

all litter once a week, scrape the platform clean and spray it with chlorine solution, 400 parts per million.

9) *Lime or Phosphate on the Floor.*—Every day before sweeping the floor, sprinkle it with lime or superphosphate. When the manure is spread on the land daily, superphosphate should be used instead of lime.

10) Use plenty of straw bedding.

11) Heavy producing cows that are milked three times a day are less apt to develop mastitis.

12) *First-Calf Heifers.*—A brom-thymol-blue test is made of each heifer that freshens. If negative, the heifer is placed in a clean group and is one of the first animals to be milked.

13) *Dry Cows.*—The brom-thymol-blue test is run on each cow within three to four days after freshening. If the milk is negative and from a cow that was in a clean group during the previous lactation period, she is placed in a clean group. Brom-thymol-positive cows are checked by careful physical and laboratory examinations. Such cows often fall into the suspicious group.

14) *Purchased Additions.*—Each cow brought into the herd is carefully examined for mastitis or other disease before being purchased. A veterinarian's certificate of health should be required. Another precaution is to handle the purchased animal as a potentially dangerous one until proved by proper examination to be sound.

15) *Rearing Calves.*—Feed calves only milk from disease-free cows and do not permit calves to suckle one another.

Only 5 per cent of the money spent for agricultural research goes for discovering new uses for farm products. The 95 per cent is spent to increase production of the usual crops.—*Pathfinder*.

Melanosis and Melanomas in Dogs*

ROBERT B. McCLELLAND, D.V.M.

Buffalo, N. Y.

THE SKIN PIGMENT, melanin, is recognized as a defensive agent against the short solar rays, and as a phenomenal means of blending an animal with its habitual surroundings. Albinos, lacking such natural protection, are subjected to lifelong danger both from the elements and from their predatory enemies.

The production and physiological deposition of melanin are still not well understood, although several workers have added copiously to our knowledge of the subject.

Bloch,¹ following the leads presented by Thormählen,¹ Spencer¹ and Quattini, found that a solution of 3:4 dihydroxyphenylalanine (dopa), when oxidized by a specific intracellular ferment (dopa-oxydase), produced a brown pigment. Concluding that dopa is similar to a colorless chromogenic substance in the blood plasma, Bloch could differentiate, histologically, the true melanoblast, which theoretically contains the specific ferment.

There is no little controversy as to the histogenesis of the melanoblast. While Jaeger¹ and Ribbert¹ believe that the cell is of mesothelial origin, Unna,¹ Krompecher and Kromayer,¹ Acton,² Kornfeld and Spencer² and Dawson³ favor an epidermal origin. Laidlaw and Murray¹ support Mason's¹ theory of neurogenic derivation.

The melanoblasts are situated at the junction of the pigmented basal cells with the derma, whence they disperse pigment granules into the epidermis.⁴ Cells containing, but not producing, melanin (melanophores) are seen in the epidermis, corium, choroid layer of the eye⁴ and pia mater of the medulla.⁵ Unequal distribution, or con-

centration, of melanoblasts results in the color pattern of animals and ephelides (freckles) in man. Although the melanoblasts are present at birth, physiological activation may take place later in life; an example is the keratinized portion of the nose and footpads in dogs, which may be pink at birth but rapidly become saturated with melanin.

It is difficult to know just where to draw the line between physiological and pathological pigmentation in dogs. In adults, areas of melanosis appear in the skin without apparent cause.

It is known that activity of the melanoblasts is stimulated by the soft rays with the longer wavelengths (ultraviolet, alpha and beta) and, to a certain extent, x-rays. Increased pigmentation also results from exposure to actinic rays when the skin has been sensitized by substances such as impure naphthalene and creosote.⁶

Contact, parasitic or nonspecific dermatitis in dogs often results in temporary or permanent pigmentation of the skin. Even though some untreated cases show evidence of increased dopa reaction, there is a question as to whether therapeutic agents may not photosensitize the skin. Large areas of melanosis commonly develop after removal of the hair and constant application of crude oil or coal-tar preparations.

Acanthosis nigricans is "a disease characterized by the formation of soft, velvety or verrucous plaques formed primarily by papillary hypertrophy in certain regions."⁶ The condition is recognized in both dogs and man. Two types are noted: a malignant type, associated with malignant tumors of the internal organs,⁷ and an independent, benign type. Milks calls atten-

¹Quoted by Affleck.⁶

²Quoted by Dawson.³

³Dawson, J. W.: *The melanomata*. Edinburgh Med. J., xxxii (1925), p. 502.

⁴Maximow and Bloom: *Textbook of Pathology* (W. B. Saunders Co., Philadelphia, 1935).

⁵Feldman, W. H.: *Neoplasms of Domesticated Animals* (W. B. Saunders Co., Philadelphia, 1932).

⁶Becker and Obermayer: *Modern Dermatology and Syphilology* (J. B. Lippincott Co., Philadelphia, 1940).

⁷Fletcher, C. E.: Possible common genetic factor in acanthosis nigricans and cancer: an observation. *J. A. V. M. A.*, xcvi (June 1940), pp. 736-739.

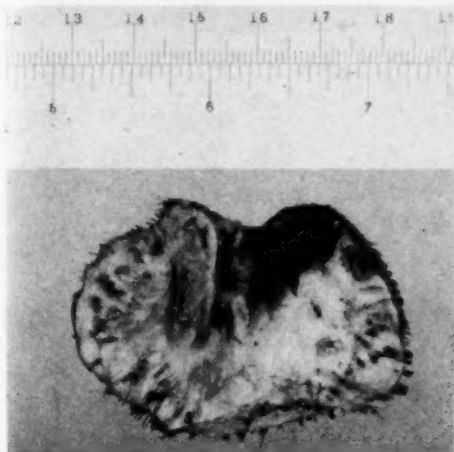


Fig. 1. Cross section of a benign hairy nevus. The patient was a young Doberman Pinscher. The tumor had been present since birth.

tion to the bilateral anatomical location of lesions in dogs.

Most of our cases of acanthosis nigricans have been in Dachshunds, between the ages of 2 and 6 years. All were classified as benign. The lesions first developed in the axillae, then in the groins, along the belly, and on the ears.

Sections showed an irregularly thickened epidermis without hyperkeratosis, abundant melanophores, and a mild leucocytic infiltration of the corium. Differential diagnosis was made by the process of elimination; when no specific cause was evident, we called the condition acanthosis. In one case, with a typical history and lesions, demodectic mange mites were isolated. In two others, fungoid dermatitis developed

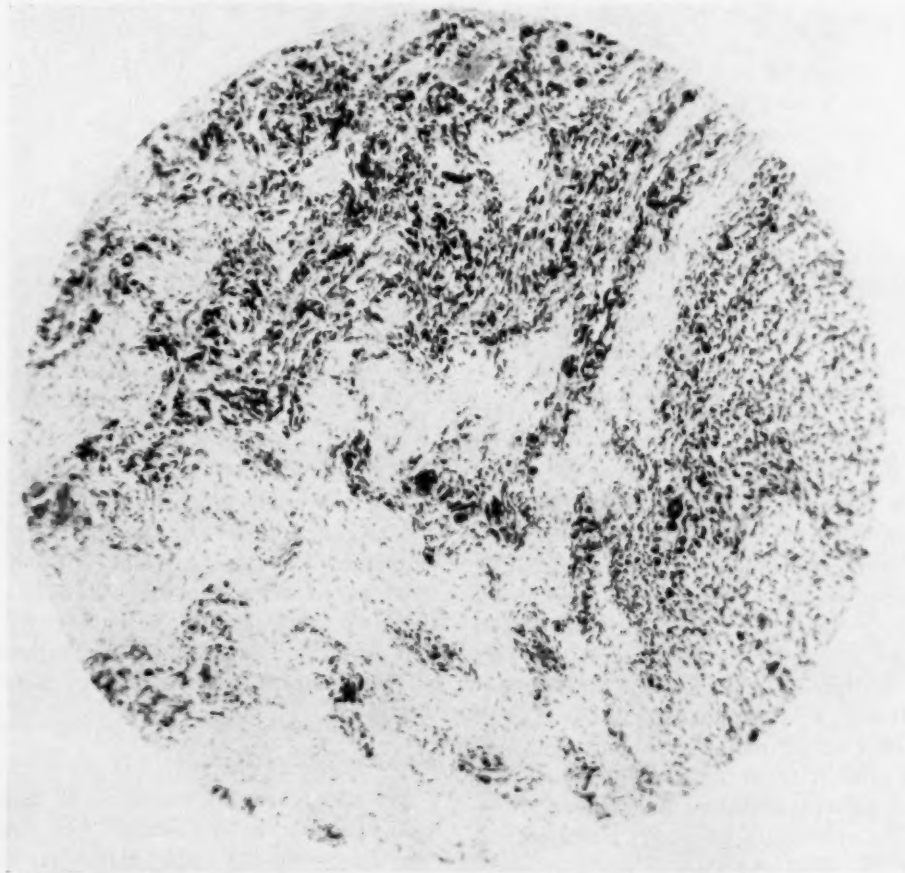


Fig. 2. Photomicrograph of malignant melanoma of the tongue. This untreated neoplasm, in a 10-year-old Chow, metastasized freely. The section resembles neurogenic sarcoma; the small, spindle-shaped cells form bundles and whorls. Most of the pigment is in phagocytic cells. (x 100.)

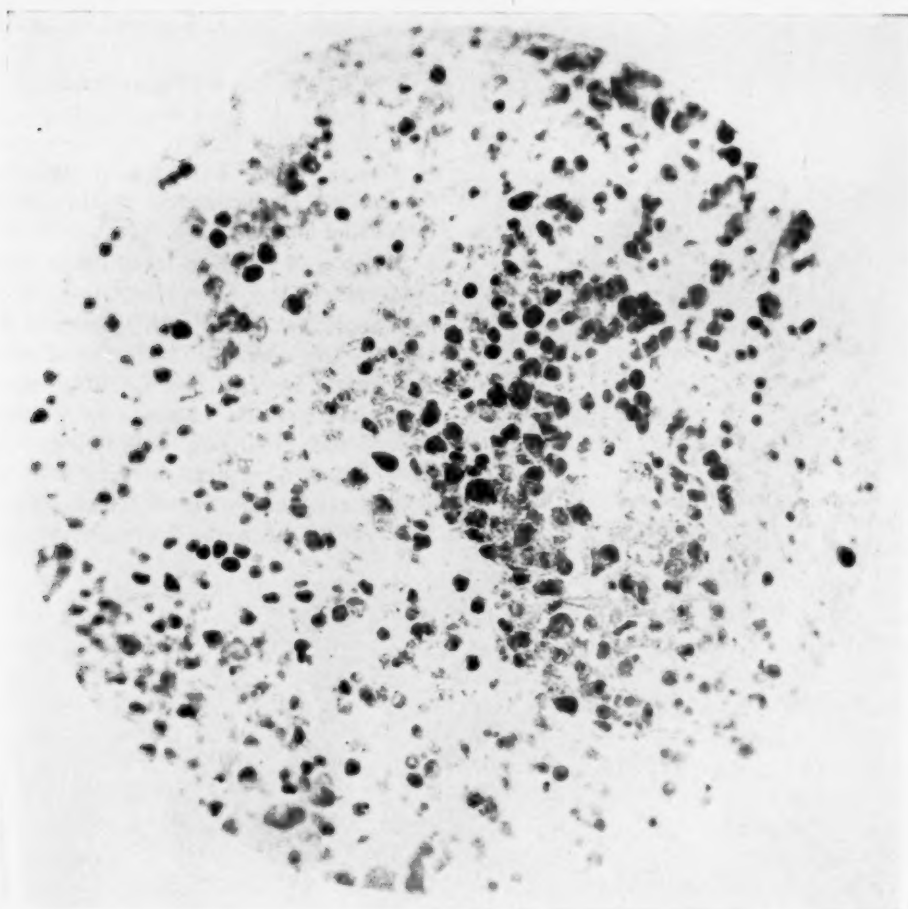


Fig. 3. High-power photomicrograph of a choroid melanoma. The tumor was removed at autopsy from an aged Boston Terrier. Groups of epithelioid cells are noted, some of which contain pigment.

along the back and tail shortly after the animals were first seen, thus complicating the diagnosis.

The benign melanoma (pigmented nevus, pigmented mole) is apparently uncommon in dogs.⁵ Nevi are common in man where they are present from birth and are subject to malignant change. Fehr and Wilder⁸ encountered what appeared to be a hairy nevus in a young male Doberman Pinscher. It was present from birth. The tumor was about 5 cm. in diameter and raised 2 cm. above the epidermis (fig. 1). Excision was successful. Sections showed nests of nevus cells in the dermal papillae and grouped

around hypertrophied hair follicles. There was no increase in chromophores.

Malignant melanomas (melanosarcomas, neuromelanosarcomas, melanoepitheliomas), common in old gray horses and frequently noted in man,⁹ are not often seen in dogs.⁵ They probably are the most malignant of all neoplasms,¹⁰ seldom failing to result in death.

REPORT OF CASES

We have observed two cases of malignant melanoma, both in Chows. The first case was an 8-year-old male Chow. Here, there

⁸Affleck, D. H.: Melanomas. *Amer. J. Canc.*, xxvii (1936), pp. 120-138.

¹⁰Ewing: *Neoplastic Diseases* (W. B. Saunders Co., Philadelphia, 1938).

⁵Fehr, F., and Wilder, H.: Personal communication.

is a possibility of malignant change in a pigmented nevus, for the lesion had been present on the medial surface of the metacarpal region "for at least three years." Recently the tumor had rapidly doubled in size. Its surface was irregular, raw and bleeding, and highly pigmented. It was excised. Five months later the case came to autopsy. The melanoma had metastasized to the popliteal and inguinal lymph nodes, mesenteric lymph nodes, and lungs.

The second case was a 10-year-old male Chow, autopsied by Wilder⁸ and the author. The primary lesion was on the dorsal surface of the tongue (fig. 2). Metastatic lesions were in the frenum linguae, cervical lymph nodes, mediastinum parietal pleura, and lungs. The lesion on the tongue was 5 cm. in diameter, slightly raised with an irregular surface. The metastases were soft, friable and highly pigmented.

We have seen two cases of unilateral choroid melanoma in dogs. Both were aged Boston Terriers. The symptoms were blindness, increased intraocular pressure, interstitial keratitis and pain.

Enucleation was performed in one case. Black, raised plaques were noted in the sclera behind the attachment of the bulbar conjunctiva. Sections showed masses of intracellular melanin. The animal appeared to be in good health one year later.

The second case was destroyed and autopsied. There were soft, gray, well-confined masses, about 1 cm. in diameter, attached to the sclera. Both chambers of the eye contained black, friable material. There were no metastases. One lung contained a primary, bronchiogenic adenocarcinoma. Sections of the scleral masses showed melanoblasts, but little pigment (fig. 3). The chambers showed few melanoblasts and large masses of melanin.

COMMENT

In spite of the elucidating theories of many workers, the melanoblast remains a clinical phenomenon. In dogs the cell plays an important rôle in the problem of pathological pigmentation and in malignant melanomas.

It is interesting to note that both malig-

nant melanomas described herein occurred in Chows, a breed in which the skin and oral mucosa are normally heavily pigmented. Both choroid melanomas were in Boston Terriers; neither showed evidence of metastasis.

The Teeth of Elephants

DENTITION in the elephant is highly specialized. An understanding of it is a fine lesson in comparative physiology. The elephant has no premolar and no canine teeth and but two incisors—the tusks—one on each side, which are implanted as always in the premaxilla. These two incisors, the largest teeth of the present animal kingdom, may measure two yards in length. Each one of these tremendous bulks of polished dentine (ivory) may weigh as much as 175 lb. in males. The dental formula is:

$$\begin{array}{l} \text{Maxillary: } \left\{ \begin{array}{ccc} 1 & 0 & 1 \end{array} \right\} \\ \quad \quad \quad 2 \left\{ \begin{array}{ccc} 1 & 0 & M \end{array} \right\} = 6 \\ \text{Mandibular: } \left\{ \begin{array}{ccc} 0 & 0 & 1 \end{array} \right\} \end{array}$$

The molar denture is unique. It contains in all, four teeth, but one per arcade. Up to 30 years of age, the molars are deciduous, being replaced by successors at definite intervals (see table I) like the shedding of incisors and premolars of the other mammals. The ones that erupt at the age of 30 remain through the rest of life.

The molar of the elephant is composed of bulky plates of hard dentine surrounded with thinner plates of enamel, solidly welded with abundant cement. The dentine and enamel *elements* (plates) run not transversely but obliquely in the medio-distal direction (fig. 1). As in the molars of herb eaters, the edges of the enamel plates help to form the effective grinding tables characteristic in the herbivorous group of mammals. In fact, these four teeth, which must grind the tremendous amount of coarse herbage a bulky creature like the elephant requires through a long life for growth and maintenance, are "fearfully and wonderfully made." That in dental construction, the molar of the elephant, has no equal in the realm of nature, any anatomist would agree. To provide the required grind-

ing capacity, the area of the table increases with each replacement: from four elements in the first one arriving at 3 months of age to the 24 to 27 elements in the sixth and last replacement which arrives at 30 years. The time of eruption, number of elements, and their dimensions are shown in table I.

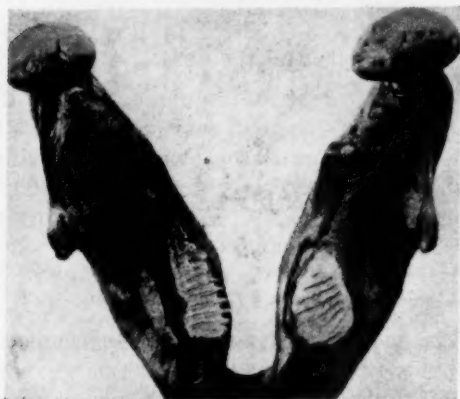
TABLE I—Evolution of the Elephant's Molars¹

ORDER OF ERUPTION	NUMBER OF ELEMENTS	DIMENSIONS OF ELEMENTS	AGE OF ANIMAL
1st	4	6 x 3 cm.*	3 mo.
2nd	8	8 x 4 cm.*	2 yrs.
3rd	12	10 x 5 cm.	5 yrs.
4th	12-14	20 x 7.5 cm.	10 yrs.
5th	16-18	25 x 7.5 cm.	20 yrs.
6th†	24-27	37 x 8 cm.	30 yrs.

*Variable.

†Remains permanent through life.

In the examination of elephants of known age the elements visible may not correspond precisely with these figures, but



The two mandibular molars of an elephant dead at the age of 19 years, after 17 years of captive life. The number of elements was below normal for that age, but the autopsy showed the presence of delayed elements about to make up the deficit.

when the *os sacculi dentis* beneath is examined, free elements already fused to the block will be found preparing to take their proper place at the level of the grinding table.²

The molars are "chased out" by the

¹Compiled from the text of a monograph (1938), entitled *Le Déséquilibre Alimentaire dans les Troubles du Métabolisme Calcaire (Ossification et Dentition) en Pathologie Humaine et Comparée*, by Geo. Beltrami, professor of the Faculty of Medicine, Marseille, France.

²*Ibid.* p. 6.

coming replacements by horizontal, not vertical, action as in the other domestic mammals. The process has been compared by naturalists to the automatic reloading of a magazine rifle. When one bullet is shot out, another comes in, ready to meet the same fate. The difference is that the last bullet (the sixth replacement) in the magazine does not discharge.

It is reasonable to suppose that domesticated or captive elephants are subject to the perturbations of unnatural alimentation which reflect upon the sequences of orderly dentition. The coming replacements bottled up on every side are subject to retarded development and even pathologic atrophy which change the normal schedule of eruption. This fact has been pointed out by students of captive wildlife, especially of herbivorous species accustomed to a sufficient intake of the vitamin C³ gathered in green vegetation which is believed to be instrumental in building up a normal dental mechanism.

The teeth of the elephant, owing to its long life, have furnished veterinary-dental pathologists important evidence of the relation of domestication to dental debacles. They are mentioned here, not so much as a lesson on dentition in general, but particularly to challenge the old notion that teeth are merely foreign objects implanted into the skeleton without participating in the sum of normal biological processes—in the health of the mammalian species.

President Roosevelt has two police dogs at his Hyde Park home and a Scotty named Falla at the White House. Falla was named for Murray of Falla Hill, a notorious outlaw.

Civilization is undergoing suburbanization and, as a consequence of the transition, town folks, city folks and large city folks all look alike and all feel equal to one another. Reason: automobiles, radios, magazines, libraries, electric illumination and modern gadgets in the homes.

³*Ibid.* p. 29.

CURRENT LITERATURE

ABSTRACTS

Harpooning the Liver to Obtain Biopsy Specimens

A technic is described for obtaining biopsy specimens from the liver, principally to aid in the diagnosis of infectious anemia of horses; it is of value also in the diagnosis of deficiency anemias and hepatic cirrhosis.

The instrument is a long, narrow, sharp trocar placed in a special container for sterilization by boiling. It is inserted in the 14th intercostal space on the right side just above the lower border of the lung. This point can be found readily by percussion. The edge of the lung is moved to one side by the instrument, or else a small degree of pneumothorax may be established by allowing air to enter to remove the lung from the operative field. In cattle the entrance is made *via* the last intercostal space on the right side.

The procedure is simple and bears little risk. About 900 such operations have been made in Sweden in the past five years. [Isaksson, A., and Jonsson, G. *Om leverharpunering av häst och nötkreatur som diagnostiskt hjälpmedel. Skand. Vet. Tidsk., xxxi (1941), pp. 87-97. English summary, pp. 96-97.*]

A. G. K.

Freemartins

A freemartin is a sexually imperfect female calf, twinborn with a male and usually sterile. This anomalous bovine was known to the Romans. Varro, 28 B. C., wrote of freemartins. The derivation of the word is not known. Guesses as to its origin are just that. John Hunter, in 1779, published an anatomical description of a freemartin that was referred to for 150 years as the

basis in making comparisons. In recent years the subject has interested biologists, embryologists and geneticists, some of whom contend that the freemartin is a modified male, others that it is a modified female. Differences of opinion are not surprising, since one may be entirely devoid of internal genitalia and another, with all external female characteristics, may be found to possess all of the male genital organs in modified form.

As to cause, the theory of Lillie (1916-1923) has been widely accepted. To him, the freemartin is the result of a monochorial placenta. One set of fetal membranes served for both fetuses and the blood vessels permitted free circulation between the two. If both were of the same sex, no harm was done, but if the sex differed, the development of the female genital organs was suppressed. The female was sterilized and in extreme cases male organs developed in the twin that was once female, through the action of the male hormones (Chapin, 1917). Pearl (1912) showed in a case of triplet calves that one male was capable of sterilizing two females.

Sex intergrades occur in other mammals but are most common in goats and cattle. They have been described in sheep, horses, camels, swine and asses. Fincher and Williams (1937), however, found a six-fetus chorion having abundant anastomosis in which the four males failed to delay or injure the genital development of the two females. There is a wide difference of opinion as to whether the freemartin is peculiar to the bovine species, *i.e.*, that this type of a sexuality does not occur in other mammals.

Studies of 123 mixed human twins (Young, 1937) showed that all but eleven of the females had families, a ratio com-

parable to the general average of 1,252 marriages studied.

The ratio of sterility of the bovine freemartin is about 12 to 1. The ratio given by Williams (1936) is 7 to 1. Cattle-breeding associations do not register twinborn females until after they have freshened, on account of the low breeding average.

The authors made a painstaking study of 17 freemartins at the Beltsville, Md., station (seven Jerseys, eight Holstein-Friesians, two grades). All of those kept to breeding age were incapable of reproduction, and upon postmortem examination, the usual wide range of genital development was found. They ranged from but slightly modified organs to practical absence of them.

While nothing fundamental is added to the sum of knowledge about the freemartin, the work is a graphic reminder that the female of mixed twins in the bovine species is a sexually and otherwise physically inferior being and, therefore, not a good economic prospect. [Swett, W. W., senior animal husbandman, Mathiews, C. A., assistant dairy husbandman, and Graves, R. R., chief, Division of Cattle Breeding, Feeding and Management Investigation, Bureau of Dairy Industry, U. S. Department of Agriculture. *Early Recognition of the Freemartin Condition in Heifers Twinborn with Bulls. Journal of Agricultural Research*, *lxi* (Oct. 15, 1940), pp. 587-623.]

The Virus-Disease Problems

The epidemiology of virus diseases as a problem is similar to that of bacterial infections with exceptions peculiar to certain viruses. Some viruses spread rapidly through a susceptible population while others require intermediate hosts of various kinds. Smallpox and influenza are examples of direct contagions, rabies is a disease accidentally inoculated, and yellow fever one that is transmitted by an intermediate host. As in bacterial diseases the epidemiology deals with (1) seed, (2) sower, and (3) soil. In virus diseases the seed is too small to be seen and can be cultivated only in media containing living

cells, and since its presence can be detected only by its effect upon a susceptible host, it is difficult to find elsewhere.

Seasonal prevalence of virus diseases created such terms as "measles year," "influenza year," etc., but there is no explanation for this periodicity. Whether viruses undergo cyclic fluctuations in virulence or invasiveness is not known. Except for the encephalitides, they tend to be vernal or autumnal. The question is baffling.

Apologizing for talking about veterinary medicine to an audience interested only in human medicine, the speaker expressed hope that the relation of the two fields is understandable. Pseudorabies ("mad itch") and swine influenza were drawn upon as epidemiological patterns of virus diseases. The former, though noncontagious in cattle, is transmitted to swine in almost inapparent form and spreads among swine via the respiratory tract, thence back to the skin of cattle with which their (swine's) noses come in contact in feed lots. The presumption was that in the outbreaks investigated the disease originated in swine not known to be carrying the virus. Perhaps the rat is the source, since the wild brown rat of the farms contracts pseudorabies from eating tissues of animals dead of the disease, and in turn when the carcasses of the dead rats were fed to swine, a typical mild form of the disease was produced. Thus it is only when the disease goes from swine to cattle that its presence on a farm becomes known. Obviously, carcasses of cattle gnawed by rats furnish a fresh source of the virus. The cycle is rat to swine to cow and back to rat.

The speaker discussed also swine influenza. Here it was explained that the cycle runs from the larvae of the lungworm of influenza-affected swine to earthworms and thence back to the definite host—the hog. The seasonal stimuli to this sequence account for the seasonal incidence of swine influenza.

Here are two epizootically different virus diseases. In the one (pseudorabies) the clinically afflicted animals (cattle) do not spread the infection to susceptible animals of the same species; the latter contract it

from an intermediate host affected with the disease in inapparent form. In the other (swine influenza), the clinically afflicted animals spread the disease (through the lung worm larvae-earthworm intermediary). These two patterns indicate that complete understanding of the epidemiology of virus diseases "will be achieved only through studies of natural histories. [Shope, Richard E., M.D. Department of Animal and Plant Pathology, The Rockefeller Institute for Medical Research, Princeton, N. J. *Problems in the Epidemiology of Virus Diseases*. Illinois Health Messenger, xiii (March 1, 1941), pp. 30-35.]

Sporadic Bovine Encephalomyelitis

The disease occurs in range and milkpen calves, 1 month to 1 year old, in the plateau region of western Texas. It was described by McNutt (1940) in Iowa, who saw it in cattle 3 years of age or less. Although but two or three are sick, nearly one half of the calf crop was affected in one of the outbreaks studied.

The symptoms are high fever (105° to 107° F.), rapid loss of flesh, dullness, posterior incoördination, shallow respirations turning to gasping in the later stages, strong, full and rapid pulse becoming weak and imperceptible toward the end, and inability to rise as death approaches. The duration is about ten days; the mortality, 50 per cent.

McNutt transmitted the disease to other calves and to guinea pigs with subcutaneous and intraperitoneal injections. In September 1939, the author transmitted the infection to calves with brain emulsion derived from a calf that died of the disease.

Inoculations of five different germ-free filtrates were negative. Although McNutt produced the disease four times out of twelve times with filtrates of uncertain quality, the author doubts that the agent is a filtrable virus. Though obviously transmitted by contact, the disease is not very contagious.

Post mortem, there are no gross lesions in the victims that die in the first few days.

After running the typical course, there is fibrinous peritonitis and pleurisy. These findings are pathognomonic of bovine encephalomyelitis. Two quarts of ascitic fluid containing particles of a yellow fibrin which are scattered over the surface of the liver, omentum and mesentery are characteristic of the postmortem picture. Although fibrinous and scattered over the pleura, the dropsy in the thorax is less pronounced. The cerebral cavity is also dropsical. A small amount of clear fluid escapes when the skull is removed.

The microscopic findings are liquefaction necrosis, cuffing of blood vessels, monocytic infiltration and edema in all areas of the brain. No successful treatment is known. [Boughton, I. B. *Sporadic Bovine Encephalomyelitis*. The Texas Veterinary Bulletin, iii (March 1941), pp. 1 and 2.]

The Knowledge of the Vitamin B Complex

All of the vitamins known and named by letters of the alphabet 21 years ago have been identified chemically and all of them can now be synthesized and employed therapeutically. Their names, now household words, are vitamins A, B₁, B₂, C and D. Moreover, during these 21 years vitamins E, K, P, and ten more B fractions have been added to the list. Of this newer group, nicotinic acid, pyridoxin, pantothenic acid, several naphthoquinones and alpha-tocopherol have been isolated and synthesized. These were discovered in 1939 and 1940 by biological chemists and they have been placed in the hands of the clinicians for use.

In the B group, the discoveries have been rapid and, needless to say, sensational. Of the 12 fractions of the vitamin B complex, five are now in use in crystalline form. These are thiamin hydrochloride (B₁), riboflavin (B₂), pyridoxin (B₆), nicotinic acid (p-p factor) and pantothenic acid (filtrate factor). The discovery of these five fractions and their controlled use in crystalline form were far-reaching in the advance of medicine: (1) The clinical

tableau of B-vitamin deficiency was clarified. (2) The list of known diseases due to nutritional deficiency was enlarged. (3) Deficiency diseases were shown to be multiple rather than single deficiencies of certain vitamins. (4) Laboratory methods for the diagnosis of vitamin deficiencies have been developed. (5) The removal of vitamins from food in processing and the need of restoring them has been recognized. (6) Syndromes for each of these five deficiencies

by which each may be distinguished from the other have been fairly well worked out.

The group of symptoms brought about by deficiency of these B fractions are described and practical suggestions on restoring wheat bread to its former nutritive level are given. [Jolliffe, N. *Newer Knowledge of the Vitamin B Complex. Bulletin of the New York Academy of Medicine*, xvii (March 1941), pp. 195-200.]

Abstracts from

*American Journal of Veterinary Research**

Bacterial Dissociation in *Brucella Abortus*

A comprehensive study of the phenomenon of bacterial dissociation in connection with the BAI vaccine strain 19 has demonstrated the fact that this culture may exhibit the usual pattern of variations associated with most *Brucella* cultures. The modifying effect of inherent strain stability is exemplified in strain 19, which under suitable conditions maintains a remarkable constancy of character. However, less favorable environment frequently lends itself to the production of bacterial variants, such cultures exhibiting three primary colonial types, namely: the S (smooth), I (intermediate) and R (rough) forms. A less frequently encountered dissociant possessing characteristics distinctly different from the usual types was recently observed.

These dissociative changes are best detected by suitable employment of obliquely transmitted light. The utilization of this principle makes possible the demonstration of colony variations indistinguishable under the usual vertical lighting arrangement.

Bacterial instability in the *Brucella* group is characterized by gradual progressive

changes occurring in the course of the S to R conversion. Significant differences in the serologic relationship of advanced dissociative forms as compared with the typical smooth types have been confirmed by cross-agglutination and agglutinin-absorption tests. Variations of this nature associated with the development of atypical forms in most *Brucella* cultures may, if not controlled, adversely affect the immunologic properties of vaccines prepared for the control of bovine brucellosis. The value of competent supervision of *Brucella abortus* vaccine cultures is emphasized and a basis for such control established. [Mingle, C. K., and Manthei, C. A., *Animal Disease Station, U. S. Bureau of Animal Industry, Beltsville, Md. Bacterial Dissociation in Brucella Abortus. American Journal of Veterinary Research*, ii (April 1941), pp. 181-190.]

Swine Pox

An outbreak of pox in swine showing a rather unusual type of lesion is described. The virus was isolated and the disease was transmitted to susceptible pigs. Experimental transmission of the disease to animals other than swine was unsuccessful. The pathologic changes observed on the backs of the experimental swine resembled those found in the field cases, while those produced on the underline were typical of those caused by pox infections. Under field

*In order to afford the widest possible reader coverage of the outstanding articles published in the Association's new quarterly periodical, *American Journal of Veterinary Research*, these columns will henceforth carry abstracts of the majority of papers appearing therein.

conditions the disease was apparently spread by insects other than the louse. The symptoms of the disease were mild and the mortality was very low. The virus is immunologically distinct from that of vaccinia. Recovery from this disease produces immunity against subsequent infection but does not immunize against infection from vaccinia virus. This condition is designated provisionally as swine pox. [Schwarte, L. H., and Biester, H. E., *Veterinary Research Institute, Iowa State College. Pox in Swine. American Journal of Veterinary Research*, ii (April 1941), pp. 136-140.]

Studies on Horse Blood

Four hundred and ten examinations for calcium, inorganic phosphorus and proteins of the serum obtained from 330 horses were collated according to the effects of sex, age, season of the year, feeding, pregnancy and pathology. Total calcium ranged from 11 to 13.5 mg. per cent, averaging 12.2 (s.d. [= standard deviation] .05), with principal variations associated with seasonal changes and differences in feed. Inorganic phosphorus varied grossly from 2 to 8 mg. per cent, receding gradually with advancing age from 7.1 (s.d. 0.4) in foals less than 3 months old to 3.1 (s.d. 0.6) in horses over 5 years. A seasonal tide was observed in phosphorus, with maxima in midsummer. Total proteins ranged normally from 5 to 7 Gm. per cent, averaging 6.1 (s.d. 0.3) in males and nonpregnant females more than 3 months old. Younger foals showed lower protein levels (5.1) and pregnant mares were higher (6.7). Seasonal change seemed to be an important factor in protein variations. A clinical method for the coordination of these data was suggested and demonstrated in a series of diseased subjects.

Cases of bone lesions revealed a distinct tendency toward blood deficits in calcium and phosphorus, particularly the latter, with the deficit more pronounced in the more acute cases. Other clinical groups also were studied, including a series of "bleeders" (spontaneous epistaxis) which failed to manifest deficits in either of

these elements. [Craigie, A. H. Jr., *School of Veterinary Medicine, University of Pennsylvania*, and Gadd, J. D., *Towson, Md. The Determination and Clinical Correlation of Variations in the Calcium, Inorganic Phosphorus, and Serum Proteins of Horse Blood. American Journal of Veterinary Research*, ii (April 1941), pp. 227-256.]

Hereditary Transmission of Anaplasmosis

A case of hereditary transmission of *Anaplasma marginale* is reported. A replete *Dermacentor andersoni* female tick taken from a cow in Wyoming with an early clinical case of anaplasmosis deposited eggs in the laboratory. The larvae resulting from these eggs were allowed to feed on a normal cow which developed clinical signs of anaplasmosis 39 days after the larvae first fed.

Progeny from half-replete ticks collected in Wyoming at the same time failed to transmit anaplasmosis when fed on a normal cow. [Howell, D. E., *Oklahoma Agricultural Experiment Station*; Stiles, G. W., *Branch Pathological Laboratory, U. S. Bureau of Animal Industry, Denver, Colo.*; and Moe, L. H., *Oklahoma Agricultural Experiment Station. The Hereditary Transmission of Anaplasmosis by Dermacentor Andersoni Stiles. American Journal of Veterinary Research*, ii (April 1941), pp. 165-166.]

Blood Chemistry of the Fox

Studies were undertaken to establish certain of the normal blood indices of mature silver and maturing red foxes. In all cases, samples were obtained by cardiac puncture. With the exception of calcium and phosphorus determinations, samples for study were drawn into Wintrobe's oxalate mixture. Hemoglobin and phosphorus were determined by photolorimetric methods, and calcium by the method of Clark and Collip. Hematocrit was determined by use of the Wintrobe hematocrit tube and erythrocytes were counted on a Levy counting chamber with improved Neubauer rulings. Mean

corpuscular volume, mean corpuscular hemoglobin and mean corpuscular hemoglobin concentration were calculated by the method suggested by Wintrobe. The average erythrocyte count for the mature silver fox is 7.97 million per cmm., the average hematocrit is 59 per cent and the average hemoglobin is 15 Gm. per 100 cc. of blood. Mean corpuscular volume, mean corpuscular hemoglobin and mean corpuscular hemoglobin concentration are 74.8 cu. μ , 18.77 micromicrograms and 25.1 per cent, respectively.

There is a proportional increase with age of the hemoglobin concentration, hematocrit percentage and erythrocyte counts in the maturing red fox. Age apparently has no effect on mean corpuscular volume, mean corpuscular hemoglobin and mean corpuscular hemoglobin concentration. There appears to be a slight decrease in total inorganic phosphorus as the fox reaches maturity. Data obtained from the red fox can be used in interpreting the blood chemistry of the silver fox. [Spitzer, E. H., Coombes, A. I., and Wisnicky, W., *University of Wisconsin. Preliminary Studies on the Blood Chemistry of the Fox. American Journal of Veterinary Research*, ii (April 1941), pp. 193-195.]

BOOK NOTICES

United States Live Stock Sanitary Association, 44th Annual Report

Those laboring in or connected with the livestock industry who keep informed on what this annual publication contains have a fundamental understanding of the tremendous effort required to maintain a sufficient animal population. These reports document that effort. In every analysis it is mainly the work of the veterinary service, told by chosen experts in the various fields of animal production—experts who bring out their knowledge and experiences for critical analysis by their peers, once a year. Essentially the book is a report of selected committees engaged officially in the work they describe and put on record. Since

these committees cultivate the whole field of livestock hygiene and policing, no research of current importance is lacking.

Though technical and regulatory matters predominate, these reports differ from the stereotyped literature. They are interspersed with advice and opinions from prominent stockmen and livestock officials who frankly tell the veterinary group where, how and to what extent scientifically conceived regulations affect the livestock industry, favorably or otherwise.

The USLSSA was founded in 1897 primarily to bring about a unification of livestock sanitary regulations in the various states—to overcome in that respect the American tradition of state rights which was blocking nationwide progress in animal-disease control. While the committees specially delegated to that task are seemingly discouraged, the progress made by them is not imaginary. The rights granted to the federal service and the patterns cut by the society each succeeding year have brought about more "unification" than some seem to admit. The interstate understandings of the 19th century when dire necessity caused the Association to be formed compared with the situation today are marked contrasts, thanks to these annual conventions.

The 44th annual report is outstanding on account of the importance of its contents: (1) Chief Mohler's official announcement on calfhood vaccination against bovine brucellosis; (2) McBryde and Cole's report on crystal-violet vaccine for hog cholera; (3) Schoening's treatment of the rabies problem; (4) the paper of Van Es, Olney and Blore on the introduction of serum-culture vaccination against swine erysipelas in the United States; and (5) Swales' report on phenothiazine. These are but five out of many significant disease-control measures occupying the attention of the veterinary service.

This modest little book is a gem and a giant. It represents the foundation of the work veterinarians do—the sum of knowledge on the questions for which nations maintain a veterinary profession. Not to

know what this annual report contains is spelled in one word—unqualified.

Criticism? Well, no book is perfect. In the haste of preparing such a mass of copy from many authors, infelicities creep in. Each author has style and usage which, if printed as written, make up a finished whole lacking uniformity. Editors agree that papers read before societies are tough problems. Seldom are they written with the same care as copy sent direct for publication. Moreover, in our special field, there should be more accord, for example, in naming the federal service. The "Bureau of Animal Industry, United States Department of Agriculture," is a unit of many names in our literature. When designated by a variety of names in the same document the uninformed reader may wonder how many veterinary services we have.

The annual report of the United States Live Stock Sanitary Association should be a textbook for the senior classes of our veterinary colleges. What book could be more authoritative in qualifying graduates entering the practice of veterinary medicine? [*Forty-Fourth Annual Report of the United States Live Stock Sanitary Association. Edited by Mark Welsh, secretary-treasurer, College Park, Md. Printed by Reese Press, Baltimore. Paper. 222 pages. 1941. Price \$2.00. Free to members of the USLSSA.*]

The Merck Manual

The seventh edition of this manual (1940) is a reference book containing the newest facts of pharmacology and therapeutics. Though written for the physician, it is no less valuable to the veterinarian on that account since the chemical and physical properties of therapeutic drugs used are the same and the dynamics set down for general edification on the subject apply to animals where the responses of the different species are weighed by experimental work and clinical experience. Merck's releases to the medical and veterinary professions stand out because they are modern conceptions of drug usage and free of the specu-

lative deductions which once marred the literature on materia medica.

Part I is an alphabetical list of diseases (human) covering 1,294 pages describing briefly their etiology, diagnosis, prophylaxis and treatment. The text is interspersed with many formulas scientifically conceived from pharmaceutical and therapeutic points of view. Throughout are many hints useful in animal medicine.

It is, however, the last 152 pages that the veterinarian will find most useful in his everyday work. The chapter on toxicology (part II), the dose table (part III), the materia medica of U.S.P. and Merck products (part IV), and the miscellaneous material of the final pages, make up a volume of well-compiled information that is easy to find when needed. The two pages of physiological normals (tabulated) is a fund of useful knowledge in modern diagnostic work. The norms of urine (human), blood, gastric contents, milk, cerebrospinal fluid, etc., are there to consult when the memory fails, and the same applies to the newest knowledge of blood chemistry, vitamins, and blood pressure. Tables on saturated solutions, thermometric equivalents, atomic number and weight of the 92 elements, and the usual metric equivalents of weights and measures, are sources of a great deal of detail the mind does not always retain. [*The Merck Manual, seventh edition. Edited and published by Merck & Company, Inc., Rahway, N. J., 1940. 1,436 pages, 5½"x3¼". Price \$2.00.*]

The Pharmacology of Anesthetic Drugs

Surgeons, teachers of pharmacology, and the makers of pharmaceutical products will be interested in this book—the latest issue of a publisher who seems to have the canny knack of printing works on medical topics that stand out from the crowd. This one is not an exception, for besides the importance of the subject itself is the unique way the text is unfolded. Graphic chemical formulas and diagrams of the human body, cells and organs tell the story of anesthetic drugs in a way heretofore unknown in medical literature and in such a fashion as to

impress the reader with the author's profound understanding of the subject as well as the tremendous amount of information he was able to put into an 86-page book. Though much of the text is admittedly controversial, the author has compiled the known facts and the theories about the mechanisms of narcosis and anesthesia as they impressed him in his clinical experiences.

A *coup d'oeil* at the opening page already aids the writer of a short review in describing the author's plan of covering the whole subject in condensed form and without notable omission. Here, eight "theories of narcosis," which could easily be spread over a number of printed pages, are condensed into a half page, illustrated by the drawing of a nucleated cell with dotted lines tracing to each of the eight short paragraphs. This explains at a glance the mechanism of narcosis as seen by that many different authorities. Likewise, the absorption and elimination of volatile and nonvolatile anesthetics are described by means of drawings of the human body or parts of it, showing as far as is known and acceptable just how this class of drugs go about annulling pain, and to what extent pain is annulled by them.

The many anesthetics not in common use are quite as completely described as the common ones. Chloroform and ethyl ether, the common volatile anesthetics of the veterinarian's surgery, are treated in six well-illustrated paragraphs giving the history of these drugs and of their uses, their preparation, properties, administration, solubility, inflammability, elimination and the precise known effects they have on the different nerve centers, organs and metabolism. It is only through the illustrations and the dotted lines connecting them to the paragraphs that so much could have been told in that small number of pages.

The barbiturates get four illustrated pages. Here, one is told that this group of narcotics was discovered already in 1903. Their preparation, chemical make-up, ab-

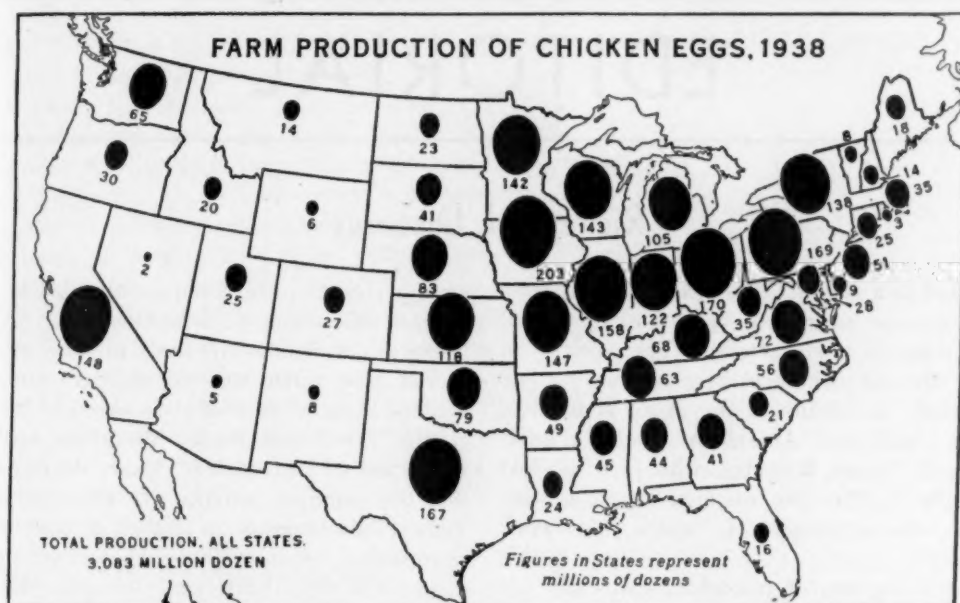
sorption, lipoid solubility, surface tension, hydrolysis (*in vitro*), detoxification, elimination, duration of action, administration, and effects on the nerve centers and organs, conform well to the wide experiences of small animal practitioners. The contraindications named are anemias, circulatory disturbances, liver and kidney diseases, toxemias, acidosis, diminished pulmonary capacity (acute or chronic). To these the veterinarian subscribed, since ignoring them caused numerous fatalities when first introduced to the animal surgeon.

The pages on local anesthetics—their history, physiology, toxicity, systemic effect, antidotal treatment, and relative toxicity of ten of them—contain new as well as known facts well established in veterinary practice through extensive experiences. The scale of decreasing toxicity of the ten local anesthetics named begins with cocaine as the standard for comparison; anesthetin is second; procaine, third; and butyn, eighth. Nupercaine is tenth, or the least toxic of the ten named. Inasmuch as there is a wide range in the response of the different species of domestic animals to the common local anesthetics and the species upon which these toxicity tests were made are not disclosed, this rating should not supersede the teaching of clinical experience. It is indeed doubtful that procaine is that much more toxic than butyn, since toxic accidents, even when extremely large doses of procaine are used, are rare in horses, cattle and swine.

Morphine, atropine and related alkaloids receive the same treatment and in the same manner as the other narcotics and anesthetics.

The analeptic drugs named for their value in resuscitation are metrazol, picrotoxin, coramine, camphor, caffeine, strychnine and lobeline. The source, properties, elimination and site of action of these drugs is knowledge to be kept in mind.

The technics of administration, pre-anesthetic medication, complications and accidents, post-anesthetic sequels, fires and explosions, doses for adults, a two-page



—Courtesy USDA.

glossary, and a long bibliography, all well indexed, make up an excellent book for study and reference. [*The Pharmacology of Anesthetic Drugs*. By John Andriani, M.D., instructor in anesthesia, New York College of Medicine, and assisting visiting anesthetist, Bellevue Hospital. Eighty-six 9" x 7" pages. Illustrated. Charles C. Thomas, Springfield, Ill., 1941. Price \$3.50.]

Eggs and Egg Products

Except for milk, meat, potatoes and flour products, eggs rate highest in *per capita* consumption in this country. The average is 300 eggs per person, or about 5 per cent of the total amount of money spent for food by each family. Less than 1 per cent of the eggs consumed in the United States are imported, and nine tenths of the rest are products of the farm. The annual production runs between 35 and 38½ billion eggs. The income derived from eggs is about \$600,000,000 annually. This source of revenue for farmers has been more than \$500,000,000 for many years. Once upon a time, country people paid their taxes by supplying imperial households with eggs.

During the past 50 years the egg trade developed into an industry of the first rank.

The number of chickens on American farms in 1940 was 429 million. Of the 3 billion dozen eggs they produced, over 2 billion dozen were sold for cash. The rest were used in the farmers' households.

Circular No. 583, USDA, from which these figures were taken, tells many details about the poultry industry, grading, candling, storing (home and warehouse), nutritive values (protein, fat, minerals, vitamins), chemical composition, cooking, uses in different forms of foods, microbiology, dried eggs, frozen eggs, relation to breeding and feeding, use of inedible eggs (tanning and leather manufacture, feed and fertilizer).

As in the case of meat and meat products and meat by-products, eggs natural and processed are officially defined. [*Eggs and Egg Products*. Circular No. 583, Bureau of Animal Industry, United States Department of Agriculture, Department Poultry Committee, John R. Mohler, chairman. 92 pages. Illustrated. Paper. Superintendent of Documents, Washington, D. C. Price 15 cents.]

EDITORIAL

Rickettsial Diseases

What is a rickettsial disease? The answer is a disease caused by a rickettsia. But, just what is a rickettsia? The answer to that, though comparatively simple, is not so brief. It begins in the professional life of a brilliant American bacteriologist, Howard Taylor Ricketts, who in 1910 lost his life in the line of duty from typhus fever, the etiology of which his work clarified.

Since the era of microbiology really began late in the 19th century, two new groups of microbic pathogens were discovered, namely, viruses and rickettsiae, distinguished from other groups (bacteria, protozoa, fungi, spirochetes) for exerting their pathogenic power chiefly within the cells of the body tissues. That is, both of them are intracellular parasites with but rare exceptions. All others flourish in extracellular media. Viruses and rickettsiae work inside of tissue cells, the others outside of them. Grossly stated, they differ only in size. Viruses are invisible to ordinary microscopic magnification. Rickettsiae are tiny bacteria that come within the range of the microscope and they can be cultivated with some difficulty in certain non-living media.

In nature, rickettsiae are in fact pathogenic parasites of insects (lice, fleas, mites, ticks, *et al*). In that rôle and in the long run, they may be more beneficial than harmful to higher life. Flourishing in every part of the world, civilized and uncivilized, temperate and tropical, these parasites of other parasites may be but one of nature's wonderful ways of maintaining "balance of power" among living creatures. While some of the rickettsiae, as far as is now known, may not inflict recognizable injury to their insect hosts, others are known to be insect killers. The mortality

among rickettsia-infected arthropods is one of the unknowns of microbiology. It is, however, well known that insects so infected bite warm-blooded animals and inoculate them with deadly diseases, of which typhus fever and Rocky Mountain spotted fever are two examples. Dogs, deer, cattle and the common rodents are susceptible to rickettsial diseases in either apparent or inapparent form. They are known to be reservoirs for these tiny bacteria during interepidemic periods. The rat which is mainly responsible for the so-called murine type of typhus (sporadic typhus) is a rickettsia host.

The specific agent of the European type of typhus was named *Rickettsia provancei*, that of Rocky Mountain spotted fever, *R. rickettsi* (formerly named *Dermacentroxenus rickettsii*), which was discovered by Ricketts in 1906. The European carrier is mainly the louse, the American mainly the wood tick (*Dermacentor andersoni*), occasionally the rabbit tick (*Haemaphysalis leporis-palustris*). Misery, famine, overcrowding and slums are predisposing causes, not so much because they lower resistance, but because they favor the breeding and spreading of lice. Witness Rocky Mountain spotted fever in this country among the vigorous ranchers, cowboys, hunters, prospectors, road builders and others.

Worthy of note is the fact that rickettsial diseases are quite host-specific and in that respect they again simulate viruses. They are more tissue-specific than viruses. The rickettsiae attack mainly the cells of the media of blood vessels; in typhus, the intima. Through these localizations, they produce the local and generalized phenomena (hemorrhagic eruptions, fever, organic troubles, nervous symptoms, etc.).

Not much can be said about rickettsial

diseases in clinical veterinary medicine. The subject is wide open for investigation.

The disease in South Africa, named heartwater, is a tick-borne disease of that class affecting cattle, sheep and goats. An intracellular microbe described by Cowdry* in 1925 named *R. ruminatum* as the inciting agent. Like the causal agent of typhus, its place of predilection is the cells of the intima.

The low visibility of rickettsiae, their wide geographic distribution, the numerous species of animals they parasitize, and the grave maladies they produce in the human being justify the impression that these tiny organisms may be among the veterinary problems of the future.

Chairman of AVMA Executive Board Honored

I. E. Newsom, chairman of the Executive Board, dean of the Division of Veterinary Medicine and vice-president of Colorado State College, received an honorary degree of Doctor of Science from Colorado University at an impressive ceremony held on the university campus the first week of April.



I. E. Newsom

Citation. — Patient, inspiring teacher, wise counselor and friend, international authority on sheep diseases who has saved the livestock interests of Colorado and the nation many thousands of dollars through his researches.

After receiving his veterinary degrees at San Francisco and Kansas City in 1904 and 1909, respectively, and a bachelor's degree at Colorado State, Dr. Newsom mounted from assistant professor of veterinary medicine to dean of the Division of Veterinary Medicine and vice-president of the institution. His contributions to veterinary literature have been numerous, brilliant and always manifestly utilitarian, and to

*Veterinary Bacteriology, by I. A. Merchant, 1940, p. 520.

organized veterinary medicine no one has been more faithful. His decoration by Colorado University is a reward for work well done.

Do It Now

One of the faults of the veterinary profession during the age of half-organization was allowing duties belonging to its members to pass into other hands. Inasmuch as veterinarians were not numerous and not equipped for action while a vast livestock industry was growing by leaps and bounds, livestock sanitary problems and the care of the sick fell into less competent hands. There was no organized group of college-trained animal doctors to form a dogmatic veterinary service of the kind now visualized as indispensable to mankind.

The story was well told by Professor Dalling before the National Veterinary Medical Association of Great Britain and Ireland when he said:

If we as a united profession do not seize this opportunity now, we shall be doing a disservice to future generations of veterinarians and shall see disease control parcelled out among the allied sciences and other parties interested in agriculture who are less qualified than ourselves to do the job.

The opportunity referred to was that of rehabilitating the pastoral industries which now looms important to a hard-pressed people.

Just now in America, veterinarians are leaving their practices to enter the army and other public services; deadly viruses are scattered pell mell to the four winds for use by incompetent hands in swine, in poultry, in dogs—and quick-trained laymen are the technicians; milk inspection and meat inspection are being established by towns faster than the positions can be filled by veterinarians; and, needless to say, the state laws governing the practice of veterinary medicine do not prohibit these growing evils.

"Do it now," means solid organization and wise planning that would prevent animal-disease control, *vide ut supra*, from being further parcelled out.

There will be auto races at the world-famed Indianapolis Speedway staged specially for those attending the Indianapolis session, August 11-15.

WITH THE EDITORS

Caries in Animals

An article entitled "Small Animal Dentistry" in this issue reviews the development of that field up to the present time and again brings into the literature the moot question of dental caries in domestic animals.

The dental decay that strikes practically every human being on earth today does not exist in animals. That is, the molecular decay called dental caries that starts from a spot on the surface of teeth to gradually excavate a cavity from without inward has not been found in the teeth of the veterinarian's group of patients. As if fearing to commit a sin of omission, casual writers on animal dentistry usually dismiss the subject by saying that dental caries is "rare in animals." The question extends far beyond the simple pathology, the conceptions of immunity, and knowledge of nutrition of the present day. It embraces the retrograde evolution of living matter extending far into the prehistoric ages.

Dental disease and dental degeneration seem to have gone forward hand in hand through millions of centuries in obedience to the slow but sure laws of contemporary necessity. There was dental disease among the Neanderthals and Cro-Magnons. However, in the study of dental degeneration, these were but the men of yesterday. The evolution of plants and animals through the ages that changed the anatomical architecture, the morphology and the biological processes of vital organs stretches into incomputable spans of time. In the researches on the etiology of dental caries no suspected influence has been left untouched. In the search for cause, that disease has been studied from the crude ways of primitive man to the refined social habits of modern times, and in animals from the terrifying dental mechanisms of prehistoric animals to the edentulous apartment dog of

which Secord so truthfully speaks, a dog, however, that would make a sorry showing in search for prey. No better example could be pointed out to confirm retrograde evolution as the cause of dental disease, and of which caries of the human tooth is but one of the outward expressions. Dental caries is not a disease (degenerative process) that came suddenly upon the people of modern times. It has existed since the dawn of mankind, according to the science of antiquities. Structural modifications of the dental mechanism were continuous and the declines observed have been attributed to disuse. In man, the decline is expressed as caries and in carnivora as a sort of alveoloclasia of which pyorrhea of the domestic dogs is an example. In herbivorous animals (horses, cows, sheep) owing to the attrition (wearing) to which the teeth are subjected continuously in masticating, the degenerative process takes the form of an intradental disintegration (pulpitis, leading to apical abscess). The occasional periodontal troubles are but the accidents that can overcome such a hard-worked mechanism as the herbivorous dentures. The nutritive tubules of herbivorous dentine seal up with insensitive material as fast as the crown loses substance (shortens) by wear, and so does the channel from table to pulp cavity keep closed. When these sealing processes default, the tooth "goes to pieces" through the vicissitudes to which teeth are exposed (physical injury, infection, interrupted nutrition). These two forms of dental disease, the one exterior and the other interior, are the forms of decay commonly affecting the teeth of animals, and in our studies of animal dentistry a sharp line is to be drawn between them and dental caries of the human being. There is no analogy among (a) the caries of the human tooth,

(b) the pyorrhea of the dog, and (c) the dentitis of the herb eater.

TEETH DEGENERATING

The teeth of the dog, like those of other mammals, have become structural invalids and functional sluggards to a certain degree through the years. The transformation of the domestic dog from a strictly carnivorous life could not have been accomplished without having had a striking effect upon such passive, but actively used, organs as the teeth. Like the hoof of the soliped, they have lost their textural toughness. The primitive tooth with its flint-like cap of folded enamel, its solid dentine and its remarkably stable implantation was a biological complex that has forfeited its original toughness through idleness. It is a victim of readjustments to the ways of domestic life.

Whether dental disease starts from without as in the case of pyorrhea of the dog or from within as in the dentitis of the soliped, the inherent susceptibility to decay is not now overlooked in the search for causes. The oral infections and the obvious deficiencies of diet are but the consequences of a fruitful soil for the dental disintegrations we call by various names. The etiology factors in human caries we leave to the dental pathologists, although it does not seem presumptuous to point out that man and the predaceous fauna of prehistoric times could not in this respect have differed materially at any time in the descent to modern life. Teeth are no longer as imperative to human survival, nor are they as essential to man's animal possessions. The reason is prepared foods. The animals, however, have been unfortunate in not having had a competent enough dental service in modern times to modify the physical suffering of the readjustment. Secord's article calling attention to the neglect of the dog's teeth and the bulletin of the USDA urging farmers to have the teeth of their horses checked up once a year are evidence that animal dentistry which lost caste since the turn of the century may again come into the veterinarian's agenda—starting where the science and art of

human dentistry began early in the nineteenth century.

DENTISTRY AN OUTCAST

Dentistry was a paradoxical outcast in the march of medicine. It went from barbarian to bourgeois to aristocrat only in recent decades. Not so long ago no respectable man of medicine would stoop to pay attention to teeth, least of all extract one to relieve a suffering victim of toothache. The job was barbaresque, so the thumping toothache went to the locksmith.

Dentistry has been an outcast also in the veterinary-medical curriculum. In human medicine it went its own way and formed a new profession that won a high place in the world of science, unaided and for a time ignored.

TOOTHACHE IN ANIMALS

While it may be true that the incidence of dental disease is relatively lower in animals than in man, there are reasons to believe that much remains to be known in this connection. Our patients may suffer pain (in silence) that we do not detect. Generally, a tooth is completely destroyed before it comes to the veterinarian's attention. The pain suffered during the long process of disintegration is one of the unknowns of animal pathology. The loose incisor of a dog was doubtless preceded by weeks of discomfort if not acute pain. The split molar of a horse must have caused thumping toothaches of two or more years' duration, and the agony a dog or a horse endures while an alveolar abscess is gnawing its way to the surface of the skull or into an adjacent sinus is certainly not conjectural. These are unknowns that the small animal practitioner is apt to clarify on account of the sentimental values of his patients.

Those in large animal practice have been chided for emphasizing the importance of dentistry. European authors jeered at the American colleges when they established chairs of animal dentistry and thus undertook to teach the art of dental diagnosis and treatment. The upshot is that the dexterous dental work of 40 years ago (in

horses) is now a lost art—or at least a somewhat awkward and quite crude procedure. A good start toward a proper understanding of dental physiology, dentistry and orthodontia in animals was practically abandoned.

TOOTHACHE IN HORSES

Some years ago a study was made of the symptoms of toothache in horses in a practice of considerable importance in Chicago. The cases selected were those showing the least aberration in mastication, such as inappetence, slow eating, slight ptyalism, unilateral mastication, slight turning of the head to one side while eating, the presence of unmasticated oats in the feces, unaccountable looseness of the feces, or stopping eating for a moment in the middle of a meal. Numerous horses were secured on the operating table for a careful, tooth by tooth examination of the molars, under proper illumination and special positioning of the head. In these investigations, tell-tale spots the size of, or smaller than a pinhead were probed with sharp-pointed picks of hardened steel. Spots, no different in appearance from other ones along the arcade, were found to be opening to tiny channels running into the body of the crown. Without exception, when such a channel was detected and the tooth was extracted and dissected (split vertically), the interior was found to be ridden with dental disease, regardless of its sound outward appearance and solid implantation *in situ*. The ultimate fate of such a molar (which has already undergone considerable interior disintegration and obviously has already caused a great deal of pain) is complete physical disintegration (spontaneous splitting) two or more years later, often after having caused grave empyema of the facial sinuses, or in the lower jaw, voluminous tumefaction and purulent fistula. This experience is cited to confirm the importance of regular dental examinations in animals. It would have been an excellent place for the "electric diagnostics" Secord recommends as possibly useful in canine dentistry.

Escuela Nacional de Medicina Veterinaria

THE NATIONAL veterinary school of Mexico, contrary to the general belief, is the oldest school in North America. It was established in 1856. Some veterinary historians have erroneously set the date as 1854 (Leclainche). Others, unaware that such a veterinary college existed so long on this side of the Atlantic, have always named the Ontario Veterinary College as the first pioneer. Inasmuch as the latter was founded in 1862 in Toronto at a time little attention was paid to such events, it is not surprising that the one founded in Mexico has been overlooked. Obviously, the language obstacle which we have been slow in removing was the reason that this historical fact remained so long unknown. Pan-Americanism is a newborn we are now attempting to develop into a healthy adult.

It is, therefore, gratifying to be reminded again that our good neighbor to the south had a college of veterinary medicine since 1856.

But what is also gratifying is the news that *Escuela Nacional de Medicina Veterinaria* is celebrating the 25th anniversary of its independence as an educational unit of the National University of Mexico. Formerly, it was affiliated with the school of agriculture. That the separation is a cause for celebrating is, indeed, important history. It implies, at least, that the former connection is in part responsible for the hidden past of veterinary education in Mexico.

The head master (director), Manuel H. Sarvide, of the veterinary faculty writes that on the day of the celebration—May 4, 1941—the veterinary museum of the institution, which includes a section on history, was inaugurated and he graciously requests the photographs of prominent American veterinarians which will aid in fixing facts of historical importance in the minds of the Mexican people interested in the development and conservation of domestic animals.

Pre-Convention Notes

Bring your golf clubs to the Indianapolis convention. Read about the challenge of Iowa veterinarians on page 535.

Hotel More than 7,000 rooms in 37 recognized hotels will be available to veterinarians and their guests attending the 78th annual convention in Indianapolis, August 11-15.

Facilities Because all activities of this session will be staged in the Murat Theater and Shrine Temple, there will be no headquarters hotel. The majority of those attending the convention will undoubtedly make their selection from the nine well-known Indianapolis hotels selected, after careful study, by the Committee on Local Arrangements as the most spacious and attractive. These hotels and their rates are:

	Single	Double	Twin Beds
Antlers	\$2.50-4.00	\$4.00-5.00	\$4.50-6.00
Claypool	3.00-6.00	4.50-8.00	5.50-8.00
Harrison	2.50-4.00	4.00-6.00	5.50-6.00
Lincoln	3.00-6.00	4.50-8.00	5.00-7.00
Marrott	3.00-up	6.00-up	6.00-up
Severin	2.50-4.00	4.00-6.00	5.00-7.00
Spink-Arms ...	2.50-6.00	4.00-7.00	
Warren	2.50-3.50	4.00-6.00	5.50-6.00
Washington ...	2.50-4.00	4.00-6.00	5.50-6.00

All of the recommended hotels are situated in the downtown business area, within a short distance of the Murat Temple. In addition, visitors whose friends are members of the Columbia Club, a new ten-story building in the heart of the city, or the Indianapolis Athletic Club, may secure rooms in either of these buildings. The rates at the Columbia Club are \$3.00-\$4.50 for a single room and \$5.00-\$7.00 for a double room; at the Athletic Club, \$2.50-\$4.00 for a single room and \$6.00 for a double room.

For the Ladies A tour through colorful South America, through the medium of technicolor motion pictures, will be the highlight of the luncheon program of the Women's Auxiliary at the Indianapolis Athletic Club, August 12.

Julia Bock Harwood, eminent traveler and lecturer, will speak on "South America—A Land of Contrasts." Illustrating her

talk with technicolor movies and presenting models dressed in native costumes, Mrs. Harwood will take her audience on an imaginary voyage from New York City to Rio de Janeiro, "most beautiful port of the Seven Seas," to Brazil, to the great coffee port of Santos, to Montevideo, Buenos Aires, Chile, Peru, Ecuador and Colombia.

A card party and general session of the Auxiliary will follow Mrs. Harwood's talk.

Many other social events—being planned by the sub-committee on ladies' entertainment, capably headed by Mrs. J. C. Schoenlaub of Indianapolis—promise to make the 1941 convention a banner get-together for the ladies. High up on the list are sight-seeing trips and a visit to the Real Silk hosiery mill in Indianapolis. In addition, the entire convention will find diversion at



"Cotton" Henning, racing car mechanic in charge of the Boyle racing team for the past ten years. The Boyle team will stage two special 10-mile races, a 5-mile race and a tire-changing contest at the Indianapolis Speedway during the 78th annual session. Pictured with Henning is his dog "Speedy," another veteran of the speedways.



Home of James Whitcomb Riley, beloved Hoosier poet. Located in Indianapolis, this home is preserved as a shrine and is visited annually by thousands of persons from all parts of the world.

automobile races (specially staged for the AVMA) on the Indianapolis Speedway, the annual banquet and ball, and the president's reception.

Clinical Program

A combination of the most popular clinical features of all past AVMA conventions will be offered at the 78th annual session. According to the tentative program announced by the local committee, clinics

will be held on the morning and afternoon of Friday, August 15, in Murat Temple.

Because of the importance of conserving the nation's food supply, particularly in this period of national defense, the Sheep and Swine Clinic will receive more than the usual share of attention, and it is expected that newspapers and magazines throughout the country will give unprecedented recognition, *via* stories and reports



Left: Partial view of the World War Memorial Plaza, showing Obelisk Square in the foreground. American Legion headquarters are situated in distant left corner of Plaza, Indianapolis Public Library in distant center. Right: Indiana state capitol building.



Scottish Rite Cathedral, scene of the annual banquet and dance at the Indianapolis convention.

in their columns, to this part of the program. For the veterinarians in attendance, keen interest will center around the many types of enteritis demonstrated, the various modes of swine anesthesia, parasitisms, cesarean section, and clinical diagnosis of pig anemia.

Among the features of the Cattle Clinic will be demonstrations on artificial insemination, heifer spaying, mastitis testing and teat and udder surgery.

The attention of practitioners of equine medicine will be turned to nerve blocking for both head and limb surgery, eye diseases, tracheal disturbances, pregnancy tests, and diagnosis and correction of skin affections.

The interest in poultry practice on the part of Indiana veterinarians, who look after the health of approximately 20 million fowls, will be reflected in the wide range of disease conditions covered in the Poultry Clinic. In addition, a practical and

unique bleeding machine will be shown in operation, and a demonstration of poultry anesthesia is being arranged.

In the Small Animal Clinic, practitioners will gain new ideas and methods from the variegated program to be presented. Demonstrations of plastic surgery, transfusion technic and all of the common ailments of pet animals are planned.

Banquet

and Ball

Red-lettering the social calendar of the "World's Largest Veterinary Convention" will be the annual banquet and ball on Wednesday evening, August 13, at the Scottish Rite Cathedral.

The Scottish Rite Cathedral is one of the most distinctive structures of its kind in the country. Of Tudor-Gothic architecture, it was erected at a cost of \$3,500,000. In the 212-ft. tower above the entrance is perhaps the finest carillon in the world.

On Tuesday evening of the convention week, the president's reception and ball will be held in Murat Temple.

THE NEWS

AVMA Activities

Veterinarians in National Defense: Surveys Made to Determine Need for Deferment of Students in Certain Professional and Technical Fields

Although proposed group-deferment legislation for men in the medical, dental and veterinary fields has been tabled as announced in the May issue of the JOURNAL (p. 426), recent releases and memoranda from Selective Service officials in Washington have called attention to developments which show the need of occupational deferment of students and other necessary individuals in certain specialized professional fields. Studies made for the Office of Production Management by the Bureau of Labor Statistics, a memorandum states, have conclusively demonstrated that the supply of manpower in those fields definitely and directly related to the national defense program is at a dangerously low level, and that it is necessary that this level be raised. It is further stated that the flow of trained graduates into certain fields should not be unnecessarily interrupted by the action of any agency of government. The specific fields mentioned are civil, electrical, chemical, mining and metallurgical engineering, mechanical engineering and chemistry.

The memorandum also points out that authorities predict a shortage in other fields not yet studied by the Bureau of Labor Statistics. However, the Selective Service system early in May ordered deferment of medical students whose scholastic ratings indicated that they are promising future members of the medical profession. Although it is understood to be the intent of the order to include veterinary students under the general classification of medical students, it is reassuring to learn that the heads of the Army Veterinary Corps and the Surgeon General's office are prepared to present specific proof of the need for deferment of veterinary students.

In this undertaking, the AVMA office has been called upon to submit pertinent data and information for use by the Surgeon General in his presentation to the Selective Service officials. Through the cooperation of livestock sanitary officials, deans of veterinary schools, and many other qualified observers throughout the 48 states, a special survey has just been

conducted and the results forwarded to Washington. The data show unmistakably that, if deferment is not extended to veterinary students, many sections of the country will not have a sufficient number of veterinarians (some do not have enough now) to properly care for the livestock industry of the United States. This is a matter of serious concern, especially at a time of national emergency, the duration of which is unpredictable.

The facts supporting the need of uninterrupted completion of the formal technical education of veterinary students are incontrovertible. It is hoped that the responsible governmental agencies will recognize the necessity for safeguarding the country against the introduction and spread of serious livestock plagues which, for want of qualified and highly trained veterinary personnel, might seriously threaten an important phase of the national economy and destroy the source of food supplies essential to defense.

Graduate veterinarians and senior veterinary students who are subject to call under Selective Service should read the item relating to induction into the Veterinary Corps Reserve which will be found under "U. S. Government" news.

Just as this issue was going to press, an Associated Press dispatch which appeared in leading newspapers throughout the country carried word of the successful completion of efforts to defer military training of veterinarians and veterinary students. Quoting:

"Selective Service headquarters advised local draft boards yesterday [May 18] to defer military training of veterinary doctors and students. Brig. Gen. Lewis B. Hershey, acting director of Selective Service, said surveys showed there is a 'national overall shortage' of veterinarians."

Once again, the central office expresses its gratitude to the many members whose prompt and cogent responses enabled it to present an authoritative statement of real utility and value to the governmental agencies concerned.

Special Committee on National Defense

President Wight has appointed a special Committee on National Defense composed of nine members charged with the duty of outlining ways and means by which the Association can be most helpful in the preparedness program. Wm. Moore of Raleigh, N. Car., is chairman. The other members are E. A. Cahill, Kansas City, Mo.; S. O. Fladness, Aurora Hills, Va.; L. M. Hurt, Sierra Madre, Calif.; R. S. MacKellar, New York, N. Y.; L. A. Merillat, Chicago, Ill.; A. F. Schalk, Columbus, Ohio; C. H. Seagraves, Oregon City, Ore.; and R. F. Vermilya, Chicago, Ill.

New Dog Food Gets Seal

Insurance dog food, manufactured by the Ballard and Ballard Company of Louisville, Ky., has just been granted the seal of approval of the American Animal Hospital Association and the American Veterinary Medical Association. This product has wide distribution in the central and southeast portions of the United States.

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Executive Secretary Hardenbergh attended the monthly meeting of the Committee on Local Arrangements at Indianapolis, May 18, to further coordinate the Committee's plans for the annual meeting with those developed by the Scientific Council and the central office.

• • •

Editor Merillat addressed the Ohio Reserve Officers' Association at Columbus, Ohio, April 28, on "The Veterinary Service of World War I," and the Midwestern Humane Conference at Milwaukee, Wis., May 2, on the "Humane Side of Veterinary Medicine."

Proposed Amendments to the Administrative By-Laws*

Proposal 1

Add a new paragraph to section 3 of article VIII to read:

"a) Vacancies occurring on the Executive Board for any reason, during the term for which the member was duly elected, shall be filled by appointment to be made by the president. The appointee shall serve out the unexpired term of the member whose office he is appointed to fill."

Comment: Although this power is presumably conferred upon the president under his duties as outlined in article II, section 3, par-

*These proposals have been suggested for consideration by the Executive Board and House of Representatives at the Indianapolis session, in order to correct certain minor flaws in the revision adopted last year, and are made in accordance with section 3, article XIII of the by-laws.

agraph c, of the by-laws, it is probably desirable that this specific provision be made.

Proposal 2

Add a new section to article VIII to read:

"Section 7.—No member of the Executive Board shall be eligible to serve as a delegate or alternate to the House of Representatives."

Comment: This provision was in the old constitution and by-laws but was apparently overlooked in drawing up the new one.

Proposal 3

If the foregoing is adopted, it is suggested that a similar provision be added to article IX; add a new paragraph to section 3 as follows:

"c) No member of the Executive Board shall be elected or designated to serve as a delegate or alternate."

Comment: This repetition may be unnecessary but is considered desirable.

Proposal 4

Amend article VI by adding another section to read:

"Section 6.—A vacancy created in the office of treasurer by any cause shall be filled promptly by the Board of Governors, the appointment being made for the unexpired term."

Comment: Provision for replacement of every vital association officer has been made except in the instance of the treasurer. This amendment is aimed to correct this lack.

Proposal 5

Amend paragraph b of section 2, article X so that the next to the last sentence will read:

"Objections to an applicant's election shall be subject to review and action by the Executive Board, and decisions thereon shall be contained in the report of the Board to the House of Representatives."

Also, delete the last sentence in this paragraph.

Comment: The two sentences as they now stand are ambiguous.

Proposal 6

Amend paragraph a under "Committee on Program" of section 1 of article XII to read as follows:

"a) *Personnel.*—This committee shall consist of the chairmen and secretaries of the regular sections, and the executive secretary, who shall act as chairman."

Comment: In adopting the newly-revised constitution and administrative by-laws at the Washington session, a proposal was approved to set up a "Scientific Council" (see section 3 of article XIV), which comprises the section officers and charges them with the identical duties of the Committee on Program. It is desirable, therefore, to abolish either the Com-

Luncheons, style shows, card parties and many other diversions: This is the program for the ladies at the Indianapolis session, August 11-15.

mittee on Program or the Scientific Council in order to avoid confliction.

It is suggested that the Committee on Program be retained and broadened in membership as indicated and that the term "Scientific Council" be dropped as unnecessary.

Proposal 7

If proposal 6 is approved, section 3 of article XIV should be changed to read:

"Section 3.—The officers of the regular sections shall serve as the Committee on Program as provided in article XII."

Proposal 8

Add sections 4 and 5 to article XIV as follows:

"Section 4.—Papers Read by Title: No paper shall be published as having been read before a section unless it has actually been read, or unless the section shall vote to have it read by title."

"Section 5.—Property of Papers: All papers and reports of any nature presented to the Association, or to any section, shall be the property of the Association, if approved for publication in the Association journals. Prior publication elsewhere of any such papers or reports, or official abstracts thereof, shall not be made except by consent of the Board of Governors."

Proposal 9

Change section 3 of article XVII to read as follows:

"Section 3.—The Board of Governors shall serve as the Committee on JOURNAL, acting in the capacity of a managing editor."

Can You Help to Locate These Lost Members?

The aid of JOURNAL readers is solicited in locating the following members, mail to whom has been returned to the Association's central office. The last known address of each is given. Should you be able to provide information as to present residence, your advice *via* postcard or letter will be greatly appreciated.

Astle, Neville L., 415 Wolverton, Ardmore, Okla.
Austin, E. M., 3681 Indiana St., San Diego, Calif.
Baer, Richard E., 303 Custom House Bldg., Baltimore, Md.
Baxter, Joe F., Jacksonville, N. Car.
Beckley, Elizabeth G., 262 William, Lovewander, N. Y.
Bell, William Thomas, 1255 Ponce de Leon Ave., Atlanta, Ga.
Bixby, John S., Box 231, Boise, Idaho.
Blumenthal, Jacob Carl, General Delivery, Crookston, Minn.
Boehm, James A. Jr., Diana, Fla.

Cameron, Walter E., Box 516, Safford, Ariz.
Carr, A. Kenneth, 25 Champion Place, Alhambra, Calif.
Cassidy, D. L., Jefferson Barracks, Mo.
Castleberry, Guy, R.R. 2, Box 27, Phoenix, Ariz.
Christensen, Merle E., Box 413, Bonners Ferry, Idaho.
Coburn, George C., 1128 Kansas Ave., Topeka, Kan.
Corcoran, J. B., 1150 N. Barnes, Oklahoma City, Okla.
Dahlquist, Ernest J., Fayette, Iowa.
Deane, Capt. Don L., Army Medical Center, Washington, D. C.
Enge, Clifford O., Butterfield, Minn.
Enge, Percy C., Storden, Minn.
Epperson, M. E., Mingo, Ohio.
Gredinger, Eric M., Gresham Hotel, Columbia, S. Car.
Grohe, Frederick W., 1044 Heuschoe Ave., San Antonio, Texas.
Harlan, Lt. W. H., El Campo, Texas.
Harris, Frank T., 58A Latona St., San Francisco, Calif.
Hedler, Herbert, Redmond, Ore.
Hickey, James C., Lancaster, Va.
Howarth, Carl R., Rt. 1, Box 24, Salem, Ore.
Jackson, Woodrow W., 321 N. Main St., Crown Point, Ind.
Johnson, Leon Duncan, c/o Pemiscot County Veterinary Hospital, Hayti, Mo.
Kirvin, William Rossman, Veterinary Hospital, Norfolk, Va.
Klein, James E., Gainesville, Ga.
Koebel, Lt. Floyd W., Holabird Quartermaster Depot, Baltimore, Md.
Livingston, W. Steele, 1004 Shaw St., Pullman, Wash.
Loomis, Ralph E., 10 Main St., Blossburg, Pa.
Major, Fred, Box 608, Austin, Texas.
Mank, George C., 610 E. 14th, Eugene, Ore.
Mathis, Rudy C., Atlanta, Ga.
Mitchell, James F., 528 Kirkman St., Lake Charles, La.
Noller, Richard, Mankato, Kan.
Norris, C. L., State Dept. of Agriculture, Olympia, Wash.
Palen, J. S., Box 38, Newport, Minn.
Palmer, Clarence R., Rt. 1, Box 195, Walnut Creek, Calif.
Reid, Joseph E., Garrettsville, Ohio.
Rivers, Ernest W., 110 CCC, Woodsville, N. H.
Roberts, H. F., 3752 Hawk St., San Diego, Calif.
Rosenoff, Theodore D., 642 N. Oak St., Spokane, Wash.
Ruebel, Lawrence V., 211 Cedar St., Sandpoint, Idaho.
Schmidt, A. I., Box 495, Woodward, Okla.
Sevy, Claude, Littleton, Colo.
Sherwood, W. J., Box 522, Washington, N. Car.
Smit, Capt. Walter, Fort Clark, Texas.
Snodgrass, W. B., Veterinary Hospital, Salem, Ore.

Spielholz, Barney, 758 Ellery Ave., Newark, N. J.

Steele, Capt. M. L., Fort Leavenworth, Kan.

Sucher, Harry V., Ripley, W. Va.

Swarthout, Edward W., 206 E. Church St., Collinsville, Ill.

Turner, C. W., Shasta Highway, Chico, Calif.

Wadsworth, Samuel F., 26 Cummington St., Boston, Mass.

Whittlesey, J. M. (honorary member), Lakeside, Conn.

Wilder, Lt. Claude O., Fort Benning, Ga.

Wilmot, Clement E., Box 962, Eureka, Calif.

Wilson, Edward J., 3017 Kensington, Richmond, W. Va.

Zimdahl, Robert O., Orlando, Fla.

BOND, L. P.

Grandview, Wash.

D.V.M., Washington State College, 1919.

Vouchers: P. G. MacKintosh and R. L. Clinton.

CHAMBERLAYNE, E. C.

214 Ash St., New Westminster, B. C.

B.V.Sc., Ontario Veterinary College, 1941.

Vouchers: J. G. Jervis and W. J. R. Fowler.

CLARK, J. STANLEY

Box 53, Forest, Ont.

B.V.Sc., Ontario Veterinary College, 1941.

Vouchers: R. A. McIntosh and W. J. R. Fowler.

COLEMAN, L. G.

5 Allan St., Carleton Place, Ont.

B.V.Sc., Ontario Veterinary College, 1941.

Vouchers: C. D. McGilvray and R. A. McIntosh.

DUCKWORTH, R. E.

828 Euclid Ave., Berkeley, Calif.

D.V.M., San Francisco Veterinary College, 1915.

Vouchers: W. L. Curtis and J. G. Hardenbergh.

EDDY, EDWARD C.

174 Brant Ave., Brantford, Ont.

B.V.Sc., Ontario Veterinary College, 1941.

Vouchers: R. A. McIntosh and V. R. Brown.

ELLIS, V. A.

Holstein, Ont.

B.V.Sc., Ontario Veterinary College, 1941.

Vouchers: H. S. MacDonald and Victor R. Brown.

FELLER, R. G.

Walton, Ind.

D.V.M., Ohio State University, 1926.

Vouchers: D. D. Baker and Walter K. York.

FIDLER, CHARLES E.

Springfield, Ill.

M.D.C., Chicago Veterinary College, 1905.

Vouchers: L. A. Merillat and J. G. Hardenbergh.

GALLAGHER, JOHN A.

215 Crescent Ave., Buffalo, N. Y.

B.V.Sc., Ontario Veterinary College, 1941.

Vouchers: H. S. MacDonald and Horace F. Wilder.

GATES, CHARLES H.

Liberty, Ind.

D.V.M., Indiana Veterinary College, 1921.

Vouchers: C. C. Donelson and R. L. Bridge.

GROVES, R. W.

c/o Blythe Farm, R. R. No. 3, Fenelon Falls, Ont.

B.V.Sc., Ontario Veterinary College, 1941.

Vouchers: H. S. MacDonald and R. A. McIntosh.

INGHAM, ROBT. E.

52 Pleasant St., Waterville, Me.

B.V.Sc., Ontario Veterinary College, 1939.

Vouchers: P. R. Baird and E. C. Moore.

Executive Board Elections in Districts VI and VIII

Ballots were mailed on May 10 to members in good standing in Districts VI and VIII for the election of a member to represent each of these districts on the Executive Board.

On May 6, W. A. Young and F. A. Anderson of Chicago, Ill., served as tellers to count the nominating ballots, the polls having closed on the preceding day, and certified the following men as candidates:

District VI: Jos. M. Arburua, W. L. Curtis, C. U. Duckworth, James Farquharson, L. M. Hurt and I. E. Newson.

District VII: C. H. Fauks, E. J. Frick, M. E. Gleason, Ashe Lockhart and Hubert Schmidt.

A tie vote for fifth place in District VI necessitated the listing of six candidates instead of the usual five.

The election polls will close July 10 for both districts.

Attention: McKillip Alumni

R. E. Kepner, assistant general chairman of the Committee on Local Arrangements, announces that McKillip Veterinary College alumni are to be organized at the Indianapolis session. Graduates of this college are requested to watch for further announcements in these columns, and to make plans now to be present for the founding of what promises to be one of the largest veterinary alumni societies ever formed.

APPLICATIONS

First Listing*

ANDERSON, HERBERT T.

Whitelaw, Alta.

B.V.Sc., Ontario Veterinary College, 1941.

Vouchers: H. E. MacDonald and R. A. McIntosh.

*See January 1941 issue, page 88.

- JONES, HUBERT
111 North St., Mountain Grove, Mo.
D.V.M., St. Joseph Veterinary College, 1921.
Vouchers: H. W. Young and J. C. Flynn.
- KIRK, R. J.
Experimental Fur Farm, University of Manitoba, Winnipeg, Man.
B.V.Sc., Ontario Veterinary College, 1941.
Vouchers: J. A. Allen and H. S. MacDonald.
- KOERNER, JOHN B. JR.
Sykesville, Md.
D.V.S., Grand Rapids Veterinary College, 1911.
Vouchers: C. L. Everson and A. L. Brueckner.
- MARKS, BERNARD
409 New Post Office Bldg., Montgomery, Ala.
D.V.M., Alabama Polytechnic Institute, 1940.
Vouchers: R. S. Sugg and W. E. Cotton.
- PHILLIPS, S. C.
Sheridan, Ind.
V.M.D., Indiana Veterinary College, 1907.
Vouchers: Charles C. Dobson and Walter K. York.
- PRIDDY, CHARLES W.
241 S. Olive Ave., Burbank, Calif.
D.V.M., State College of Washington, 1938.
Vouchers: W. L. Curtis and G. W. Blanche.
- SILVESTER, P. B.
10 Sargeant St., Princeton, N. J.
D.V.M., McKillip Veterinary College, 1916.
Vouchers: John T. McGrann and J. G. Hardenbergh.
- STOUT, S. W.
434 Mill Rd., Hamilton, Ohio
D.V.M., Ohio State University, 1935.
Vouchers: Leland C. Lynch and R. E. Rebrassier.
- TURNBULL, JOHN O.
Brussels, Ont.
B.V.Sc., Ontario Veterinary College, 1941.
Vouchers: R. A. McIntosh and W. J. R. Fowler.
- WILLIAMS, EDITH B.
Ontario Veterinary College, Guelph, Ont.
B.V.Sc., Ontario Veterinary College, 1941.
Vouchers: R. A. McIntosh and H. S. MacDonald.
- Second Listing**
- Armstrong, Fernando E., Kansas State College, Manhattan, Kan.
- Armstrong, George R., Gastonia, N. Car.
- Atkinson, Leroy N., 1927 N. Ash St., Hutchinson, Kan.
- Bain, L. R., R.R. No. 3, Pittsburg, Kan.
- Bartlow, F. R., 910 N. Capitol Ave., Indianapolis, Ind.
- Betts, James G., Randall, Kan.
- Boles, Evan E., 207 S. High St., Warsaw, Ind.
- Bowerman, W. D., 2535 N.W. 19, Oklahoma City, Okla.
- Brielman, Eugene O., 21 Britton St., Pittsfield, Mass.
- Brower, Arthur W., 311 W. 8th, Emporia, Kan.
- Bruce, Kenneth L., Orchard, Neb.
- Busby, Bernard, Wakefield, Neb.
- Carl, Gilbert W., 201 E. 12th St., Hutchinson, Kan.
- Chambers, Edward Eldridge, 1415 Washington, Parsons, Kan.
- Clark, Robert H., R.R. 1, Manhattan, Kan.
- Collins, Clark C., 442 N. Main St., West Point, Neb.
- Compte, Juan, P. O. Box No. 1337, Havana, Cuba.
- Davis, Shirley L., Route 3, Fort Scott, Kan.
- Dedrick, Warren James, 3244 Everett Ave., Kansas City, Kan.
- Drolet, Bernard J., 109 N. 6th St., Newark, N. J.
- Duncan, Glenn, St. Francis, Kan.
- Eberhart, George W., 511 N. 14th St., Manhattan, Kan.
- Erickson, John Ernest, Box 21, Wilson Station, Clairton, Pa.
- Eyestone, Hal, 1002 S. Catalpa, Pittsburg, Kan.
- Fausset, J. K., Spiceland, Ind.
- Flipse, Frank, Oakley, Kan.
- Frickers, J., Groote Hofstraat 7b Paramaribo, Suriname, S. A.
- Gish, John, 319 S. Main, El Dorado, Kan.
- Halver, Glenn C., Crane, Mont.
- Howell, Gordon, R.R. No. 1, Kansas City, Kan.
- Howell, H. W., Rt. No. 1, Kansas City, Kan.
- Immenschuh, R. D., Kansas State College, Manhattan, Kan.
- Jones, Charles F., R.F.D. No. 3, Lisbon, N. Y.
- Kadets, Martin, 29 Oak Knoll Rd., Natick, Mass.
- Karnes, Jacob L., Benton, Ky.
- Keller, Edward J., St. Francis, Kan.
- Kelley, Virgil R., 327½ S. "D" St., Arkansas City, Kan.
- Koger, R. B., Robbins Ranch, Belvidere, Kan.
- Laird, G. W., 4000 E. 68 Terrace, Kansas City, Mo.
- Lemen, Clifford A., Veterinary Research Laboratory, Manhattan, Kan.
- Lichlyter, Frank E., 610 Cave Springs, El Dorado, Kan.
- Lynn, E. M., 8216 So. Wabash Ave., Chicago, Ill.
- McMahan, Keith, 1401 N. 10th St., Manhattan, Kan.
- McPeck, Raymond Charles, 31 Main St., Ramsey, N. J.
- Manley, David O., Wakarusa, Kan.
- Medaris, Jack L., 1520 Crawford, Parsons, Kan.
- Meriweather, Herbert, 1001 Osage, Manhattan, Kan.
- Mundell, Earl, 1876 Tennyson St., Kansas City, Kan.
- Newhart, Charles C., Kansas State College, Manhattan, Kan.
- Paulsen, Cecil, 1429 Laramie St., Manhattan, Kan.

Payne, Loyal Cobb, Route One, Manhattan, Kan.

Pierce, LeRoy Albert, 712 Laramie St., Manhattan, Kan.

Port, Rodney I., Sundance, Wyo.

Prather, Elwin R., Eureka, Kan.

Reed, Myron D., Smith Center, Kan.

Renfrow, Charles, West Plains, Mo.

Schendel, Samuel A., Richmond, Kan.

Smith, Charles Combie, 858—22nd St., Santa Monica, Calif.

Smith, Chas. L., R.F.D. No. 1, Harveyville, Kan.

Smotherman, W. M., P. O. Box 45, Huntsville, Texas.

Stanzel, Raymond W., La Harpe, Kan.

Stitt, Marvin, Clearwater, Kan.

Swaim, A. A., c/o Wilson & Co., 4100 S. Ashland Ave., Chicago, Ill.

Swart, R. W., 515 Thurston St., Manhattan, Kan.

Thompson, Clarence H. Jr., R.F.D. No. 2, Ozawie, Kan.

Toynnton, Clair, 1001 Osage, Manhattan, Kan.

Trostle, W. Gerald, Hope, Kan.

Trundy, Edward L., 2 Bridge St., Augusta, Me.

Vanderbilt, Wm., Eureka, Kan.

Wendt, Delbert O., Bonner Springs, Kan.

Whitney, Don, 1126 Bluemont, Phillipsburg, Kan.

Willick, E. A., c/o Burus & Co., Regina, Saskatchewan.

spring picnic as May 15. Roy Read read a proposal to amend the by-laws to make the *Veterinary Student* the official organ of the chapter.

After considerable debate, action on an honor system designed to govern all veterinary students of the College was postponed until the next meeting.

Officers were elected for the coming half year as follows: Held, president-elect; Tobola, vice-president; Hill, secretary; Beer, treasurer; Rohwer, sergeant-at-arms; Graham, critic, Feldman, representative to Cardinal Guild.

JOE A. GRAHAM, *Secretary*.

State College of Washington

Three years ago, the State College of Washington Veterinary Wives' Association was organized by Mrs. Frank Bell in order to help the wives of veterinary students to become acquainted. Meetings are held twice each school month at the Washington Hotel in Pullman.

This year the group volunteered to decorate for the banquet which closed the meetings of the combined Inland Empire and Western Washington Veterinary Medical Association, held at Pullman, May 3.

Mrs. Ed Lindenmayer is president of the group; Mrs. Ernest Stone, vice-president; and Mrs. Leland Bell, secretary-treasurer.

The active membership is composed of the wives of the following men: Ray Adams, Carrol Adams, Roland Ament, Frank Bell, Leland Bell, Archie Button, Clifford Bjork, Norman Garlich, LeMar Gaw, Joe Geierman, Newel Groves, Paul B. Haskel, Frank Herr, Ed Lindenmayer, William Merrick, Fred Metcalf, John Morris, Dave McNary, Lyle Nicholson, Bert Potts, Lee Seghetti, Ernest Stone, Robert Thornfeldt, William Thorning, Ray Vernon, Leslie White, George Williams, Smith Willis, Andrew Lloyd, Luther Christensen, and Leslie Burns.

STUDENT CHAPTER ACTIVITIES

Iowa State College

At a regular meeting of the Iowa chapter held on May 7, H. C. Smith of Fort Dodge Laboratories, Inc., Fort Dodge, Iowa, spoke on canine leptospirosis.

Earl Cook announced the date of the annual

State College of Washington Veterinary Wives' Association — auxiliary to the College's junior chapter of the AVMA.



U. S. GOVERNMENT

Graduate Veterinarians Called Under Selective Service May Be Commissioned in Veterinary Corps Reserve

According to recent information, graduate veterinarians who have been inducted into service and who meet all qualifications for a commission in the Veterinary Corps Reserve may now be commissioned after induction under the Selective Service Act. Following is an abstract from a current letter of information sent to each Chief of Arm or Service from the Adjutant General: "Individuals who are qualified for appointment in the Dental and Veterinary Corps Reserve and who have been inducted under the provisions of the Selective Training and Service Act of 1940 should be encouraged to apply for appointment in order that they may serve in a professional capacity. Individuals accepted for appointment will be discharged and ordered to extended active duty for a period of twelve consecutive months."

In effect, graduate veterinary and dental selectees who pass examinations and are found qualified for reserve commissions and are so appointed will be discharged from Selective Service training as soon as possible and ordered to active duty as reserve officers.

It is understood that such men who are subject to call, but have not yet been called, should not endeavor to obtain reserve corps commissions under this arrangement prior to the time of being ordered into training. Such efforts will only confuse and complicate the provisions which are intended for handling qualified men who are actually inducted.

Army Veterinary Service

Regular Army.—Announcement is made of the promotion of Captain Arvo T. Thompson to the grade of major, with rank from April 8, 1941.

Announcement is made of the appointment of First Lieut. Harry John Robertson, Veterinary Corps Reserve, as first lieutenant in the Veterinary Corps, Regular Army, with rank from April 22, 1941, and assigned to station at Mitchel Field, N. Y.

Captain Harry B. Roshon is relieved from his present assignment and duty at Fort George G. Meade, Md., is assigned to the 29th division at that station and will report to the commanding general, 29th division, for duty with the Veterinary Corps.

Veterinary Corps Reserve.—Captain William E. Eggert, Jr., is relieved from assignment and duty at the New York Port of Embarkation, Brooklyn, N. Y., effective on or about

May 5, 1941, and assigned to duty at the Front Royal Quartermaster Remount Depot, Front Royal, Va.

First Lieut. Jack R. Knappenberger is relieved from his present assignment and duty at Fort Robinson, Neb., and assigned to troop B, 252nd quartermaster squadron, at that station.

First Lieut. Arthur B. Christian is relieved from assignment and duty at Camp Claiborne, La., effective on or about May 1, 1941, and assigned to the fourth corps area service command, with station at the West Palm Beach air base, West Palm Beach, Fla.

Captain Harry G. Geyer is relieved from assignment and duty at headquarters, fifth corps area, Fort Hayes, Ohio, upon completion of temporary duty at the Army Medical Center, Washington, D. C., and assigned to duty at the Quartermaster Remount Depot, Fort Reno, Okla.

First Lieut. Clifford N. Decker is relieved from assignment and duty with the 3d cavalry brigade, Fort Riley, Kan., effective on or about May 5, 1941, and assigned to the Chicago Quartermaster Depot.

Captain Donald C. Kelly is relieved from his present assignment and duty at Fort Bliss, Texas, and assigned to Ladd Field, Alaska.

First Lieut. Rowland W. Rushmore is relieved from assignment and duty at Fort Benning, Ga., effective on or about May 15, 1941, and assigned to the Army Medical Center, Washington, D. C.

Announcement is made of the promotion of the following veterinary officers now on active duty:

To Captain—First Lieut. Harry George Geyer, March 29, 1941; First Lieut. Samuel Edward Grove, April 22, 1941.

To Lt. Colonel (Temporary)—Major Archie Lee Faulk, April 4, 1941.

The following veterinary reserve officers have been ordered to extended active duty by the War Department during the month of April and assigned to stations indicated: Major Robert Sarde, Army Veterinary School, Army Medical Center, Washington, D. C.; First Lieut. Thomas W. Garrett, Fort Mason, Calif.; First Lieut. Leonard J. Abell, Fort Reno, Okla.

Each of the following-named veterinary reserve officers (first lieutenants unless otherwise indicated) is relieved from his present assignment and duty at the station indicated after his name and assigned to the Philippine department, and will sail from San Francisco on or about April 21, 1941: James G. Anderson, Fort Slocum, N. Y.; Herbert I. Ott, Camp

Blanding, Fla.; Burton C. Thomson, Fort Bragg, N. Car.; Clayton H. Mickelson, Stockton Field, Calif.; Captain Oliver W. Orson, Fort Bliss, Texas.

The following officers (first lieutenants unless otherwise indicated) of the Veterinary Corps, now on extended active duty at the stations indicated, are directed to proceed to Chicago, Ill., and report to the commanding officer, Chicago Quartermaster Depot, for temporary duty for a period of 30 days for the purpose of pursuing a course of instruction, commencing on April 28, 1941, in the inspection of meat, meat-food and dairy products, under the depot veterinarian. Upon completion of this duty each of the officers indicated will return to his proper station: Clifford H. Milks, Westover Field, Mass.; Martin G. Lorber, Fort Devens, Mass.; Walter J. Fallon, Plattsburg Barracks, N. Y.; William S. Monlux, Camp Upton, N. Y.; Robert L. Alkire, Fort Eustis, Va.; Captain Robert M. Parker, Camp Shelby, Miss.; LeRoy T. Fisher, Camp Croft, S. Car.; Ray M. Bachelder, Fort Benj. Harrison, Ind.; Raymond L. McMahan, Fort Knox, Ky.; Captain J. Lavere Davidson, Camp McCoy, Wis.; Stanley L. Hendricks, Fort Sheridan, Ill.; Captain Alfred C. Zedlitz, Fort Sam Houston, Texas; Harold B. Mills, Camp Wolters, Texas; William E. Niemeyer, 448 So. Hill St., Los Angeles, Calif.; William W. Williamson, Fort Stevens, Ore.; Marion J. Jones, Fort Riley, Kan.; Captain Charles H. Elliott, Camp Livingston, La.; Major George S. Mechling, Camp Shelby, Miss.; Major William H. Shannon, Camp Edwards, Mass.

BAI Transfers

Daniel P. Arron from Spokane, Wash., to Portland, Ore., on meat inspection.

Clifford B. Bratager from Grand Forks, N. Dak., to West Fargo, N. Dak., in charge of meat inspection.

Chalmer W. Chapin from St. Louis, Mo., to Storm Lake, Iowa, in charge of meat inspection.

John M. Dermody from Fort Dodge, Iowa, to Omaha, Neb., on virus-serum control.

Fordon L. Foy from South St. Joseph, Mo., to Atlanta, Ga., on meat inspection.

Harris H. Groten from Richmond, Va., to Harrisburg, Pa., on Bang's disease.

Aubrey M. Hutton from Milwaukee, Wis., to South St. Joseph, Mo., on meat inspection.

Kenneth L. Johnson from Little Rock, Ark., to Jackson, Miss., on Bang's disease.

Marley C. McFadden from Sioux City, Iowa, to Spokane, Wash., on meat inspection.

Glen F. Patton from Kansas City, Kan., to East St. Louis, Ill., on virus-serum control.

Webster G. Reed from Storm Lake, Iowa, to Chicago, Ill., on meat inspection.

Earl D. Richards from Austin, Minn., to

Grand Forks, N. Dak., in charge of meat inspection.

Gerald C. Richardson from Indianapolis, Ind., to Chicago, Ill., on Bang's disease.

Raymond V. Schoentrup from Waterloo, Iowa, to Fort Dodge, Iowa, on meat inspection.

John A. Thompson from West Fargo, N. Dak., to Spokane, Wash., in charge of meat inspection.

Frederick J. Weitz from Atlanta, Ga., to Milwaukee, Wis., on meat inspection.

Ernest L. Wentz from Waterloo, Iowa, to Austin, Minn., on meat inspection.

Retirements.—John P. Beck, Baltimore, Md., March 31, 1941; Herbert O. Mantor, San Francisco, Calif., March 31, 1941.

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Census Bureau reports show that 150 million persons live under the American flag. Of these, 19 million live outside of continental United States.

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The construction of 13 buildings costing \$102,508 to complete normal hospitalization of animals for the Fort Riley cantonment has been authorized by the Quartermaster General. This will be a centralized hospital to accommodate 7,500 animals to be cared for in that region.

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Veterinarians who drive government-owned cars now have a group liability insurance available to them at an attractive low rate: \$8.00 a year for personal injury up to \$5,000 and property damage up to that amount. For personal damage up to \$10,000 for one person and \$20,000 for two or more persons, the rate is \$9.50.

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Supreme Court Justice Stanley Reed, head of a committee appointed to study the civil service, has handed President Roosevelt a report recommending that all positions not of a policy-making nature requiring Senate confirmation, be placed under the Civil Service Commission. If adopted the ruling will affect over a million employes drawing over a billion dollars a year in salaries.

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"Chickens Dangerous to Hogs" is the title of a news release issued February 16 by the USDA. The document draws attention to the fact that hogs are more susceptible to avian tuberculosis than chickens themselves. The U. S. Bureau of Animal Industry, therefore, warns against allowing chickens to run in the same lot as hogs. The statement is based upon controlled experiments carried out at the Animal Disease Station at Beltsville, Md., under the supervision of Adolph Eichhorn.

AMONG THE STATES

Alberta

Dr. and Mrs. Hargrave Honored.—On the evening of February 22, a large group gathered at the home of Dr. and Mrs. G. G. Pook in Calgary to honor Dr. and Mrs. J. C. Hargrave on the occasion of the Doctor's retirement as district veterinary inspector for the province of Alberta, which became effective February 28.

During the course of the celebration, Dr. Hargrave was presented with an engraved gold watch with chain and knife, and Mrs. Hargrave with a tri-light, as a remembrance from the staff of the Health of Animals Division, Dominion Department of Agriculture. The presentation was made by T. W. Patton of Coutts in an impressive address that was fittingly replied to by Dr. Hargrave.

Dr. and Mrs. Hargrave returned to Medicine Hat early in March to again take up residence in their home there.

H. C. STOREY.

Arizona

Arizona Association Convenes with Public Health Group.—The Arizona Veterinary Medical Association held its semiannual meeting in conjunction with the Arizona Public Health Association at the Hotel Westward Ho in Phoenix, April 19-20.

Out-of-state speakers were R. G. Robinson of the Farm Security Administration, San Francisco, Calif., and H. E. Kemper of the U. S. Bureau of Animal Industry, Albuquerque, N. Mex. Dr. Robinson spoke on veterinary practice in Singapore and the Suez Canal zone and showed technicolor motion pictures taken while he was located in those districts. Dr. Kemper was the principal speaker for the veterinary association at the general session of the public health group. In addition to his address, he displayed pathological specimens mounted with watch-glass covers.

During the business session, a committee was appointed to investigate the actions of certain veterinarians within the state who have allegedly violated the state practice act. Another committee was appointed to work with the livestock sanitary board and the U. S. Bureau of Animal Industry in formulating a plan to promote calfhood vaccination for Bang's disease in Arizona, through the coöperation of the private practitioner.

J. B. McQuown of Tucson was elected delegate and G. G. Crosbie, also of Tucson, alternate, to the House of Representatives of the national association.

J. B. McQuown, *Resident Sec'y.*

Arkansas

Campbell Named State Veterinarian.—Joseph S. Campbell, prominent in the veterinary profession of Arkansas since his graduation from the Chicago Veterinary College in 1911, was appointed state veterinarian on April 14 by the state livestock sanitary board to succeed C. D. Stubbs, who had been connected with the state service for many years. Since 1937, Dr. Campbell had held the office of assistant state veterinarian.

California

Ranchers Hear Lectures on Animal Diseases.—More than 150 ranchers and veterinarians gathered at Solvang, April 16, to hear lectures on animal diseases. Addresses were made by the following veterinarians: A. N. McCapes, Kenneth McKay, Charles Coleman, B. B. White, C. E. Taylor, A. L. O'Banion, A. S. Larsen, Ernest Hutchins, C. H. Colton and J. H. Moore. Screwworms, actinomycosis, brucellosis, and artificial insemination were among the subjects presented during the full-day program.

Veterinary School Proposal Winning Approval.—The proposed veterinary school at the state university appears to be meeting popular approval. The bill introduced in the assembly was acted upon favorably by the assembly's agricultural committee. It is now [April 30] before the Ways and Means Committee, as it carries an appropriation of \$1,000,000.

It is planned to establish a six-year course in veterinary medicine; two of these years would be given at Davis and four at Berkeley.

Units of the university alumni association are backing the movement and so are cattle, sheep and allied milk interests.

Fight Animal Experimentation.—The Tailwagger Foundation of America, sponsored mainly by stars of the motion-picture industry, won their battle against a bill before the state legislature that would have given the state department of health the authority to use impounded, stray dogs for medical research. The nine members of the Public Health and Safety Committee of the senate, stormed with protests against the bill, voted 8 to 1 against its passage, proving again that the sentimentalism associated with the dog has to be reckoned with in planning means to fight diseases of man and animals.

The pros who went down in defeat were representatives of Stanford University and the California Medical Association. The cons were headed by Billie Burke, screen and stage star,

who claimed to voice the sentiment of 43,000 California dog owners.

Contentions: (1) Stray dogs should be handled in shelters financed with license money and kept there until reclaimed, given new homes, or humanely executed. (2) The bill, supported by the medical societies, did not allow enough time for owners of lost dogs to find them. (3) The measure would encourage thieves to pick up valuable dogs and sell them [obviously to the laboratory workers] and thus create a racket, alleged to exist already. (4) The bill is a humane proposal to provide uniform regulation for the handling of stray dogs, the advocates of the bill declared.

Animal experimentation as a human necessity is not mentioned in the circulated reports.

Illinois

Illinois Retrieves Lost Ground.—The appointment of C. E. Fidler (Chi. '05) as chief veterinarian will long be remembered by the veterinary profession, not only of Illinois, but of the whole nation. It forecasts the ending of a trend toward mismanagement of the veterinary service. Director of Agriculture Leonard has turned animal-disease control back to the direction of the chief veterinarian, from whom that function has been gradually wrenched during the past 20 years, despite the protests of thoughtful men in and out of the veterinary profession. Political ambitions, harmful to the whole United States, were exploited at the expense of the taxpayers and to the wholesale detriment of the livestock industry which today, everywhere in the civilized world, is charged with furnishing a sufficient food supply to the people.

In our great livestock state, in recent years, there has been no apparent delectation for the technical character of animal-disease control and, certainly, no consideration for the will and knowledge of the chief veterinarian. Sadly, this officer was called a "rubber stamp" and all pleas to replace his office to its former level met with rebuffs.

A new governor, a new director of agriculture, and a new chief veterinarian, men of force bent upon serving the people by uplifting the public service, wrought a much needed reform when they honored veterinary science by



C. E. Fidler

replacing its application in professional hands. A whole profession, from coast to coast, salutes them.—L. A. M.

Indiana

State Veterinarian Axby warned a group of farmers at Warsaw in April that hog cholera is probably due for a sharp turn upward this year. "This No. 1 killer of American swine seems to be in the ascendancy of a new cycle," Dr. Axby asserted. A basis for the prediction is the opinion expressed by the American Foundation for Animal Health which points out that outbreaks increased 30 per cent in 1938 over 1937; 25 per cent in 1939 over 1938; and 12 per cent in 1940 over 1939.

Get Out and Stay Out.—The liveliest town in the state is Charlestown, 15 miles up the Ohio River from Louisville at the mouth of the Wabash. A smokeless powder plant, costing \$74,000,000 with a capacity of 600,000 pounds of powder a day, is the exciting cause. A payroll of \$75,000 weekly to 18,000 workers has turned this drowsy Hoosier town into an arsenal, officially named the Indiana Ordnance Works.

But, what has this to do with us? For one thing, as citizens, it is reassuring to know that Uncle Sam is not the jelly fish (in preparedness) that certain willing broadcasters are telling the listening world; and, for another, the chief executive officer of Charlestown is a veterinarian, F. C. Pangborn, who is quoted in *Nation's Business* (May 1941) as saying that the town marshal and he could have made \$50,000 if they had agreed to permit gambling, but "We're not built that way. We told the gamblers to get out and stay out."

Iowa

Golfers! Here Is the Iowa Challenge.—The Iowa Veterinary Golfers' Association challenges all other states to a tournament to be held in Indianapolis, Monday, August 11, the day prior to the opening session of the AVMA convention.

The Iowans will endeavor to send a four-man team to compete against a similar foursome from other states, to compete for the veterinary championship of the United States and Canada.

All participants must be members of the AVMA or associated with ethical veterinary supply companies confining their sales to veterinarians only.

Organized Veterinary Medicine in Iowa.—There are 13 local veterinary medical associations in the state which hold regular meetings: monthly, quarterly, annual. Moreover, Iowa veterinarians cross state boundaries to participate in societies in South Dakota, Illinois and Missouri. These together with the Midwest

Small Animal Association, which is really an Iowa child, and the state organization, which has the habit of breaking attendance records, make up the most solid aggregation of veterinarians ever developed.

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Southwest Iowa Association to Incorporate.—Officers of the Southwest Iowa Veterinary Medical Association filed articles of incorporation with the county recorder at Council Bluffs in April. The signers of the corporate charter were George Wessels, George A. Hawthorne and C. C. Steele. Council Bluffs was named the principal place of business. The purposes declared are (1) to encourage and promote the best interests of veterinary medicine, (2) to unite all veterinarians in the area into one organization, (3) to familiarize livestock owners in regard to diseases of animals and their treatment, and (4) to promote the well being of animal industry.

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Cedar Valley Association.—Forty-three veterinarians from 16 counties attended the dinner meeting of the Cedar Valley association held at Waterloo, May 12. President McGrath announced that the meeting of June 9 would be "ladies night," and delegated K. L. Richie of West Union and W. A. Moeller of Waterloo to make the necessary arrangements for that session. State Veterinarian Seidell spoke on the business side of poultry raising in Iowa; P. V. Neuzil on chick and poult diseases; and J. W. Giffie, of the U. S. Bureau of Animal Industry, on prophylactic vaccination against swine erysipelas.

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Eastern Iowa Clinic.—Secretary Elson makes the following announcement in regard to the program of the Eleventh Annual Clinic: Chairman of the General Clinic Committee: Lawrence P. Scott, assisted by C. E. Juhl and V. B. Vanderloo. Head Surgeon: George R. Fowler, Iowa State College. Diagnosis: L. A. Merillat, Chicago. Equine Section: Harry S. Lames, Dysart, assisted by H. L. McCrillis and V. C. Willis. Restraint: A. L. McGrath, Jesup, assisted by F. E. Brutsman, R. C. Stewart, R. Warnock, P. E. Mayland, A. J. Murphy and B. L. Lawler. Bovine Section: G. C. Brown, Hudson, assisted by M. F. Fervert, J. P. Hoben and C. L. Moles. Swine Section: C. B. Strain, Dunkerton, assisted by F. L. Barrett, J. S. Koen, H. E. Pinkerton, H. D. Osborne, G. A. Allen, R. M. Hoffer, J. W. Giffie, L. Proctor, J. D. Ray and C. C. Graham. Sheep Section: William Andrews, Greene. Avian Section: W. M. Osborne, Independence, assisted by C. D. Lee, E. A. Benbrook, John Wineinger, K. L. Richie and E. C. Ritter.

Pet Animal Section: I. E. Hayes, Waterloo, assisted by A. R. Menary, J. H. Kritchel, C. G. Spencer and D. A. Smith.

Laboratory Diagnosis: Benj. Rosenfeld, Osage, assisted by Frank Breed, J. D. Ray, H. C. Smith and Margaret Sloss.

Registration: M. C. Larson, Keystone, assisted by D. C. Sperry, L. A. Bowstead, Jerry Hunt, R. B. Carter, Harry G. Lodge, W. F. Christopher, L. A. Kellog, T. J. Wagoner, F. A. Shearer and W. L. Derrer.

Police: C. F. Pauly, Kirkwood, Ill., assisted by H. J. Haggerty, E. A. Brockmeier, H. J. Nygren, W. M. Schneider, L. M. Darst, D. N. Voetberg, G. T. Smith and N. H. Larson.

The ladies' entertainment will be directed by Mrs. E. W. Burke, Waterloo; luncheon by W. L. Hanson and A. C. Middleton, and the luncheon entertainment by J. I. Gibson. J. W. Lucas, Abingdon, Ill., John B. Bryant, Frank Wilson and F. Raub will supervise the loud speaker arrangement. Visitors are encouraged to bring along handy devices, time savers, overalls and sharp instruments.

As the time is near, correspondents are invited to write directly to Chairman Scott, Box 325, Waterloo, for details.

Kansas

Recognition Day at Kansas State College.—On the annual Recognition Day of Kansas State College, May 1, prizes and certificates of merit were awarded to the following students in the Division of Veterinary Medicine:

HARWOOD PRIZE IN PHYSIOLOGY

\$7.50, to Robert N. Erickson, '43.

HARWOOD PRIZE IN ANATOMY

\$7.50 to Albert S. Coates, '43.

ALUMNI PRIZES IN BACTERIOLOGY AND THERAPEUTICS

First prize, \$10, to Donald K. Christian, '42; second prize, \$5, to Ralph A. Bruce, '42.

FRANKLIN PRIZES IN PATHOLOGY

First prize, \$10, to William D. Bowerman, '41; second prize, \$5, to Richard W. Swart, '41.

BOWER PRIZES IN SMALL ANIMAL CLINICS

First prize, \$10, to Leroy N. Atkinson, '41; second prize, \$5, to Robert D. Immenschuh, '41.

KANSAS VETERINARY MEDICAL ASSOCIATION PRIZES IN GENERAL PROFICIENCY

First prize, \$15, to Bernard Busby, '41; second prize, \$10, to Clark C. Collins, '41.

The contributors of the cash for these prizes are N. D. Harwood, '18; Benj. F. Pfister, '21; Earl F. Hoover, '24; O. M. Franklin, '11; Charles W. Bower, '18; and the Kansas Veterinary Medical Association.

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A decision of the State Supreme Court as of December 7, 1940, in the case of State vs.

Reynolds denies the state board of health the power to regulate the production, sale and handling of milk on the ground that that power is vested by statutes in the board of agriculture. A contrary decision of the lower court was reversed and the conviction and sentence set aside.

Maine

Maine State Association.—A regular quarterly meeting of the Maine Veterinary Medical Association was held at the University of Maine, Orono, April 19, featuring an afternoon of clinics.

G. M. Potter was in charge of the large animal clinic. The demonstrations included the use of the emasculator on a yearling Hereford by J. F. Witter, and various types of restraint with the automatic release hondas by E. L. Miller. Dr. Miller then demonstrated the high and low intradermal tuberculin test on bulls and cows. A. E. Coombs made an examination for soundness on a horse and discussed symptoms and treatment of heaves. Drs. Coombs and Witter showed dehorning methods with the aid of a local anesthetic and pulling of the arteries. Following, Dr. Potter spoke on grades of oats and showed samples to illustrate his talk. He pointed out the relationship between the quality of feeds and digestive difficulties and deficiencies in livestock.

The small animal clinic was headed by R. B. Larcom, who gave a practical demonstration of urinalysis. S. D. Merrill showed various types of stitches and their particular uses. C. E. Dutton demonstrated the surgical treatment of umbilical hernia in a cat.

The clinical session was closed with an identification quiz in which 20 specimens of various types of disease processes were shown. S. D. Merrill made the highest score.

Following the banquet, which was attended by about 40 members and their wives, President S. W. Stiles called the business meeting to order. A report from the Practice Act Committee indicated that the new practice act had been approved by the legislative committee of the state without opposition, thereby assuring Maine veterinarians higher standards in selecting candidates for licenses.

Donald Corbett, new chief of the state division of animal industry, reported on the progress of the \$450,000 bond issue for the area-control plan of Bang's disease in the state and stated that favorable progress with the bill had been made.

G. M. Potter and J. F. Witter were elected delegate and alternate, respectively, to the House of Representatives of the national association.

J. F. WITTER, *Secretary.*

Massachusetts

Angell Memorial Animal Hospital.—The Angell Memorial Animal Hospital, the most highly endowed institution of its kind, can not meet current expenses from the interest on the invested fund. The hospital has a deficit of over \$40,000 a year that must be met by income derived from other sources, mainly by gifts from residents of the city and state, without whose aid the treatment of some 50,000 animals a year could not be done. It is a project of the Massachusetts SPCA and the American Humane Education Society, neither of which receives any money from the city, state or community funds, and it has no connection with the Animal Rescue League of Boston, which also seeks donations for animal-welfare work. The AMAH has, therefore, expanded far beyond the expectations of its founder.

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"Is the horse with the set-up tail to be shown again in Massachusetts?" is a question asked by *Our Dumb Animals*, voice of the state humane society. Since 1934, it has been unlawful to show such a horse. New York and Connecticut also have laws against the tail-setting practice. Now there is a bill before the legislature to annul the law, although it seems to have the endorsement of the public.

Michigan

Davenport, Prominent Agricultural Figure, Dies.—Eugene Davenport, 84 years old, prominent figure of the agricultural circle, died recently at his farm home at Woodland, the place of his birth in 1856. He was graduated by Michigan State College in 1878. He received the degrees of Master of Science, Master of Agriculture and Doctor of Science in 1884, 1895 and 1907, respectively, from his alma mater. He also held honorary degrees from Iowa State College, the University of Kentucky, and the University of Illinois. At the latter he served as dean of agriculture for 27 years (1895-1922). Since his retirement 19 years ago, he had been living on his farm, "The Maples," near Woodland.

New York

New York City Association.—A regular meeting of the Veterinary Medical Association of New York City was held at the Hotel New Yorker in New York City, May 7, with C. E. DeCamp of Scarsdale presiding.

J. A. Morrell of the biological laboratories of E. R. Squibb & Sons, New Brunswick, N. J., spoke on "The Physiology of Hormones and Their Therapeutic Application."

Case reports were presented by J. A. S. Millar of Deal, N. J., on metastatic tumors, and

by J. B. Engle and E. P. Leonard of Summit, N. J., on pregnancy diagnosis with x-ray.

J. J. MERENDA, *Secretary*.

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Rochester Enforces Veterinary Inspection of Food Animals.—Rochester has passed and is enforcing, since May 1, a meat-inspection ordinance providing for veterinary inspection of all food animals slaughtered in that city. The service, which is conducted under the safety commissioner, will employ four inspectors who are to be appointed by the municipal Civil Service commission. The inspection will include all meat sold in the city and will be operated under the rules of the state health department. The expense, to some extent, will be defrayed by license fees paid by slaughterhouses and a per head charge for each animal slaughtered: cattle 25 cents, calves 10 cents, and 3 cents for hogs, lambs and other small animals.

North Carolina

Dairy Inspection for Military Camps.—Steps were taken at a meeting of dairy leaders in April to meet the increased demand for dairy products. The meeting was called by Commissioner of Agriculture Scott, who stated that he would call such additional meetings of farmers and dairymen as may be necessary to coordinate the agricultural industries with the army's demands for farm products.

Represented were the state department of health, the North Carolina Dairy Products Association, the Dairy Council, the state extension service, ice cream companies, the federal Congress, and the state legislature. Lieutenant Colonel D. S. Robertson and Lieutenant R. C. Fuller of the Veterinary Corps represented the Army. Col. Robertson announced the importance of Camp Davis, the marine base in Onslow county, as a permanent institution that will need an ample supply of milk, adding that the Army post at Fayetteville is getting all the milk needed at present and that the quality is good. He stressed the Army's sanitary requirements.

Congressman J. Bayard Clark told the farmers that they must get into the livestock business whether they want to or not, and that they must produce the kind of milk the Army needs.

Extension Dairyman John A. Avery spoke on the opportunity the Army has opened to North Carolina farmers, and on the necessity of raising enough feed of the right sort to increase milk production.

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Rabies Vaccination.—Only duly licensed, qualified veterinarians may administer rabies vaccine in Durham county, according to a ruling made by Health Superintendent J. H. Epperson. Durham has a regulation requiring that all dogs over 3 months old must be vaccinated against rabies.

Texas

Important state and federal legislation affecting Texas are pending at the state capital and Washington, among the proposed laws being a revision of the veterinary practice act which completely revamps the old order. A favorable outcome is expected, notwithstanding opposition from certain commercial interests within the drug trade.

Vermont

Bang's Disease Work.—A new Bang's disease law is now in operation whereby, through federal-state agreement, only the slaughter plan is used where less than 8 per cent of a herd are found to be reactors. In all other herds the test-and-vaccination plan is in force.

Virginia

Animal-Disease Research.—The Virginia Agricultural Experiment Station has set aside approximately 20 acres of land for use exclusively by its animal pathology section for disease investigational work. A cattle barn for experimental animals and an autopsy building equipped with an incinerator will be built on these premises within the coming fiscal year.

Wisconsin

Central Wisconsin Association.—The Central Wisconsin association met at River Falls, March 12. A clinic was held at the hospital of J. F. and A. E. Mack and a banquet at the Masonic Temple in the evening. The attendance was 55.

COMING MEETINGS

Small Animal Hospital Association. Los Angeles, Calif. June 3, 1941. W. K. Riddell, secretary, 3233 W. Florence Ave., Los Angeles, Calif.

New York City, Veterinary Medical Association of. Hotel New Yorker, New York, N. Y. June 4, 1941. J. J. Merenda, secretary, 136 W. 53rd St., New York, N. Y.

Dallas-Fort Worth Veterinary Medical Society. Dallas, Texas. June 5, 1941. Frank Brundrett, secretary, 1809 Atwood, Route 2, Dallas, Texas.

Houston Veterinary Association. Houston, Texas. June 5, 1941. John Tom Kirby, secretary, 2421 S. Shepherd Drive, Houston, Texas.

St. Louis District Veterinary Medical Association. Roosevelt Hotel, St. Louis, Mo. June 6, 1941. J. P. Torrey, secretary, 555 N. 14th St., East St. Louis, Ill.

Chicago Veterinary Medical Association. Hotel Sherman, Chicago, Ill. June 10, 1941. G. S. Elwood, secretary, 5449 Broadway, Chicago, Ill.

Texas State Veterinary Medical Association. School of Veterinary Medicine, Texas A & M College, College Station, Texas. June 10-12, 1941. M. B. Starnes, secretary, 2013 Commerce St., Dallas, Texas.

Oklahoma Veterinary Medical Association and Oklahoma A & M College Veterinary Short Course. Oklahoma A & M College, Stillwater, Okla. June 11-12, 1941. F. Y. S. Moore, secretary, Box 485, McAlester, Okla.

Kansas City Veterinary Medical Association. Kansas City, Mo. June 16, 1941. Glen L. Dunlap, secretary, 800 Woodswether Road, Kansas City, Mo.

San Diego County Veterinary Medical Association. Zoological Research Bldg., Balboa Park, San Diego, Calif. June 16, 1941. Paul D. DeLay, secretary, State Poultry Pathological Laboratory, Balboa Park, San Diego, Calif.

Eastern Iowa Veterinary Association, Annual Clinic. Dairy Cattle Congress Grounds, Waterloo, Iowa. June 17, 1941. R. E. Elson, secretary, Vinton, Iowa.

Southern California Veterinary Medical Association. Chamber of Commerce Bldg., Los Angeles, Calif. June 18, 1941. Charles Eastman, secretary, 725 S. Vancouver Ave., Los Angeles, Calif.

Maryland State Veterinary Medical Association. Baltimore County Humane Society, Pikesville, Md. June 18-19, 1941. Mark Welsh, secretary, College Park, Md.

Ohio State University Veterinary Conference. The Ohio State University, Columbus, Ohio. June 18-20, 1941. O. V. Brumley, dean, College of Veterinary Medicine, The Ohio State University, Columbus, Ohio.

South Carolina Association of Veterinarians. Andrew Jackson Hotel, Rock Hill, S. Car. June 24-25, 1941. R. A. Mays, secretary, 415 State Office Bldg., Columbia, S. Car.

North Carolina State Veterinary Medical Association. Wrightsville Beach, N. Car. June 26-27, 1941. J. H. Brown, secretary, Tarboro, N. Car.

Wisconsin Veterinary Medical Association. Chippewa Falls, Wis. June 26-27, 1941. B. A. Beach, secretary, University of Wisconsin, Madison, Wis.

Vermont Veterinary Medical Association. Randolph, Vt. June 27-28, 1941. G. N. Welch, secretary, Northfield, Vt.

New York State Veterinary Medical Society. Ithaca, N. Y. July 1-3, 1941. J. J. Regan, secretary, c/o General Dairy Service Corp., Utica, N. Y.

Virginia State Veterinary Medical Association. The Virginian Hotel, Lynchburg, Va. July 9-10, 1941. A. J. Sipos, secretary, 1102 State Office Bldg., Richmond, Va.

New Jersey, The Veterinary Medical Association of. Berkeley-Carteret Hotel, Asbury Park, N. J. July 10-11, 1941. J. R. Porteus, secretary, P. O. Box 938, Trenton, N. J.

Georgia State Veterinary Association. Tosco Hotel, Thomasville, Ga. July 16-17, 1941. J. E. Severin, secretary, 357 Edgewood Ave., S. E., Atlanta, Ga.

American Veterinary Medical Association. Murat Theater and Shrine Temple, Indianapolis, Ind. August 11-15, 1941. John G. Hardenbergh, executive secretary, 600 S. Michigan Ave., Chicago, Ill.

State Board Examinations

Texas State Board of Veterinary Examiners. Veterinary Hospital, College Station, Texas. June 9-10, 1941. Paul P. Boriskie, secretary, Port Arthur, Texas.

Iowa Veterinary Medical Examining Board. Office of the Division of Animal Industry, Iowa State Department of Agriculture, Des Moines, Iowa. June 10-11, 1941. Further information may be secured from H. A. Seidell, chief, Division of Animal Industry, State Capitol, Des Moines, Iowa.

Nebraska Board of Veterinary Examiners. State Capitol Bldg., Lincoln, Neb. June 18, 1941. All applications must be filed with the Bureau of Examining Boards at least 15 days prior to date of examination.

North Carolina State Board of Veterinary Medical Examiners. Wrightsville Beach, N. Car. June 25, 1941.

Connecticut Board of Veterinary Registration and Examination. Office of the Secretary, State Office Bldg., Hartford, Conn. July 1, 1941.

Oklahoma Board of Veterinary Medical Examiners. State Capitol Bldg., Oklahoma City, Okla. July 1-2, 1941. W. C. McConnell, secretary, Holdenville, Okla.

Virginia State Board of Veterinary Examiners. Lynchburg, Va. July 9, 1941. Candidates may secure application blanks and further information from H. H. Adair, secretary, Bristol, Va.

Maine Board of Veterinary Examiners. July 14, 1941. For further information communicate with S. W. Stiles, secretary, Falmouth Foreside, Me.

Utah Veterinary Medical Examining Board. Room 302, Capitol Bldg., Salt Lake City, Utah. July 14-15, 1941. Applicants must submit applications and diplomas and a \$15 examination fee, either to the Department of Registration, 326 Capitol Bldg., or to the

secretary, W. H. Hendricks, 302 Capitol Bldg., Salt Lake City, Utah. Application blanks will be furnished upon request.

Illinois State Board of Veterinary Examiners. State Department of Registration and Education, 600 S. Michigan Ave., Chicago, Ill. July 28-29, 1941. Applications should be filed with the Department 20 days before this date.

PERSONAL NOTES

Activities

David E. James (O.S.U. '34), formerly of Trenton, N. J., has entered general practice at Warren, Ohio.

Martin D. Baum (Corn. '32) has resigned from the federal service to accept the position of veterinarian with the Los Angeles (Calif.) city health department.

Charles R. Schroeder (Wash. '29), who was formerly associated with the Zoological Society of San Diego, has accepted a position with Lederle Laboratories, Inc., at Pearl River, N. Y.

Chas. H. Haasjes (Gr. Rap. '18) of Shelby, Mich., recently addressed an adult evening class in agriculture, sponsored by the Montague (Mich.) board of education, on "Diseases of Farm Animals."

K. K. Shott (Gr. Rap. '17), practitioner of Buhl, Idaho, is taking graduate work at Colorado State College. Dr. Shott has recently been credited with the development of a successful remedy for pregnancy disease of ewes.

L. E. Swanson (O.S.U. '27), formerly associate parasitologist in the Zoological Division, U. S. Bureau of Animal Industry, has moved to Gainesville, Fla., where he is in charge of parasite investigations for the Florida Agricultural Experiment Station.

Warren Rawlings (U.P. '28), who was formerly associated with the biological department of the National Drug Co., is now engaged by the Pitman-Moore Co. at Zionsville, Ind., in full charge of the production of both veterinary and human biological products.

Adrian M. Mills (Corn. '20), formerly associated with the Borden Company and more recently manager of the Earlville Farms at Earlville, N. Y., has accepted the position of sanitary inspector and veterinary advisor to the Milk Commission of the Medical Society of the County of New York.

C. O. Williamson (O.S.U. '20), who for the past four years has been meat inspector for Butte, Mont., and dealt in livestock, has purchased a half interest in, and will manage, the land and livestock business of Mr. George R. Shepard in the Flathead Valley of Montana.

The business consists of the buying and selling of land, some intensive farming, and the breeding of beef cattle and fine saddle horses.

Birth

To Dr. (U.P. '37) and Mrs. Edward C. Preston of Newton, N. J., a son, Robert Edward, April 29, 1941.

DEATHS

P. E. Nulph of Campbellsport, Wis., died on April 5, 1941.

Born at Lake Crystal, Minn., April 28, 1877, Dr. Nulph was graduated from the Grand Rapids Veterinary College in 1912.

M. H. Leininger of the U. S. Bureau of Animal Industry died at Omaha, Neb., March 2, 1941.

Dr. Leininger was graduated from the Kansas City Veterinary College in 1911.

Leonard R. Pratt, 39, of Denver, Colo., died on April 28, 1941, from an accidentally inflicted gunshot wound. On April 20, he was wounded when a revolver which he was transferring from a shoulder holster to a compartment in his automobile accidentally discharged.

Dr. Pratt was graduated from Colorado State College in 1923.

George W. Iden of Bluemont, Va., died on April 12, 1941, at the Winchester Memorial Hospital, Winchester, Va., from pneumonia following injuries suffered when he was knocked down by runaway horses hitched to a wagon on his farm.

Dr. Iden was graduated from the U. S. College of Veterinary Surgeons in 1921.

C. A. Burnette of Winsted, Conn., died at the age of 57 on May 4, 1941.

Born at Brimfield, Mass., May 7, 1883, Dr. Burnette was graduated from the Ontario Veterinary College in 1916. He was a member of the Connecticut Veterinary Medical Association, the New Hampshire Veterinary Medical Association, and the national association.

M. W. Drake of Philadelphia, Pa., died on May 6, 1941.

Born in July of 1865, Dr. Drake was graduated from the New York-American Veterinary College in 1890. He was a member of the Pennsylvania State Veterinary Medical Association, The Veterinary Medical Association of New Jersey, the Keystone Veterinary Medical Association, and the national association, having joined the latter in 1899.

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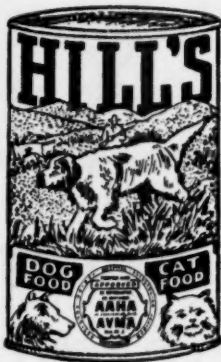
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An' Related Topics

Food Needed

"One of the needs in national defense," says Secretary of Agriculture Wickard, "is more laying hens and pullets." Elsewhere we read: "Even now, as some are saying that our principal problem is still one of surplus, this is true only so far as export products go. But, so far as pork, dairy products, poultry, eggs, tomatoes and some other foods are concerned, they're all wrong, dead wrong. Remember that there are thousands of our people who have never had the right kinds of food. We can put the food we store up to good advantage here and abroad. A part of any program for the defense of a democracy is to be certain that our men, women and children have enough good food to keep them healthy and strong."

Speaking along this vein, Vice-President Wallace is quoted as saying, "It is only when human beings become the primary object of conservation that conservation becomes the highest national virtue."

The First Anesthetics*

The oldest of the drugs used to annul the pain of surgery is mandragora, a genus of the nightshade (Solanaceae) family. Half an ounce of an infusion of mandragora given in wine was said by the ancient surgeons to possess sufficient narcotic action to annul the pain of an amputation.

Nitrous oxide (laughing gas) first came into use as a dental anesthetic in 1799 when Davy, a chemist of 19, inhaled this gas to ease the pain he was suffering from the eruption of a wisdom tooth. It was, however, not until 1844 that laughing gas came into more general use in dental work. Horace Wells, a dentist of Boston, had an aching molar extracted from his own mouth under its influence, but his public demon-

*The word was coined by Oliver Wendell Holmes at the time Morton demonstrated the use of ether by inhalation for the removal of a tumor of the jaw by J. C. Warren, surgeon of the Harvard Medical School.

(Continued on page xxii)



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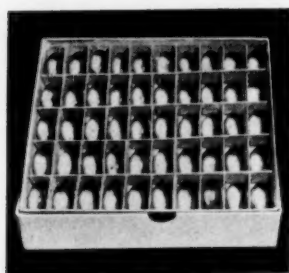
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An' Related Topics

(Continued from page xx)

stration of its use for surgery failed because he did not give a sufficient amount.

Ethyl ether first prepared by Valerius Cordus in 1549 was not employed as an anesthetic until 1842 when Crawford Long, young physician of Georgia, performed a painless extirpation of a tumor (of the neck) under its influence. In 1846, the pain-annulling action of ether was demonstrated by Dentist W. C. T. Morton of Boston at the Massachusetts General Hospital (October 16, 1846).

Chloroform was first prepared in 1831 by Lieber. Its anesthetic action by inhalation was demonstrated in animals in 1847 by Flourens and in man by Simpson in 1848, following the historic demonstration of Morton with ether.

Morphine was first prepared by Sätürner in 1805. Given with large doses of alcohol, it was soon found to confer a more profound narcosis than the galenicals of the ancient surgeons. It is, therefore, true that no appreciable advance in surgical anesthesia was made through all of the centuries of ancient, medieval and modern times until the beginning of the 19th century. In other words, the first half of the 19th century was a notable period in the history of surgery.

Fine Wool

The term "fine wool" means sheep's wool of fine fiber, classed as 60's and upward. It requires a climate with a mean average temperature of 60° to 64° F. and medium rainfall. One such region is in the southern hemisphere between 30° and 40° south latitude which is the most important wool-growing region in the world. It includes South America, South Africa and Australia. A second such region includes Spain, southern France, southern Germany, parts of Russia and the United States. There are 736 million sheep in the world nearly half of which produce wool of little commercial value.—*Indian Journal of Veterinary Science and Animal Husbandry.*

(Continued on page xxiv)

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An' Related Topics

(Continued from page xxii)

National Wildlife Refuges

As of 1941, there are 267 wildlife refuges aggregating 13,740,304 acres in continental United States, Alaska, Hawaii and Puerto Rico. The number of refuges in the states is 251 comprising 9,646,072 acres. Of these, 178 (3,554,356 acres) are for migratory birds; 50 (107,679 acres) for non-game birds; 14 (6,643,138 acres) for big game; and 25 (3,436,131 acres) for upland game, migratory birds other than waterfowl, and miscellaneous forms of wildlife.

Most of the refuges are controlled by the Fish and Wildlife Service of the Department of the Interior. A few of these refuges, however, are controlled by executive order or otherwise. Wildlife Leaflet, Department of the Interior, March 1941, gives a tabulated account of the location, acreage, and purpose of these refuges for the information of those interested in these details.

The Popular Meats

Pork scores high in the American dietary. It is far-and-away the meat that turns up most often on the table. Out of every 100 lb. of meat eaten in 1939, 42 lb. were pork. After pork comes beef with 35 lb. to every 100 lb. eaten. Chicken is third with 12 out of every hundred. Veal, mutton and lamb, and turkeys come next, and in that order.

(Continued on page xxviii)

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An' Related Topics

(Continued from page xxiv)

Butter Ranks High in Nutrition

Britain is asking Australia and New Zealand to speed up the production of dairy products, says a report¹ received from South Australia. The obvious reason is to avert a shortage of food positively essential to human welfare. It is a matter of record (World War I) that fighting forces are better physically and mentally and have more power to resist fatigue and mental strain if supplied with plenty of butter. Moreover, the excellent physical strength of the New Zealanders is due to their high *per capita* consumption of butter. Butter ranks higher in every score than other aliphatic hydrocarbons. Besides being palatable and easy to digest, it contains nutritive elements in concentrated form that other fats do not possess: lecithin, cholesterol, phospholipoids and vitamins A (carotene), D and E, which make up a marvelous compound of nutritive material of high caloric value that has never been duplicated by synthetic methods.

Another example of the superiority of butter over ordinary fats of either plant or animal sources is the ghee of India. Ghee is butter clarified and processed to improve its keeping properties, and it contains 3,300 calories per pound. It balances the vegetable diet of the native Indian population. Of the 700 million maunds² of fluid milk produced in India, 364 million maunds are made into ghee, the nutritive and economic value of which is such that practically every farmer is engaged in dairying as a sideline. The dairy cow is, therefore, not just the foster mother of children, but is the godmother of nations as well.

¹The Journal of Agriculture of South Australia.

²A maund is 82.286 lb. avoirdupois, comparable to the capacity of the American milk can.

(Continued on page xxx)

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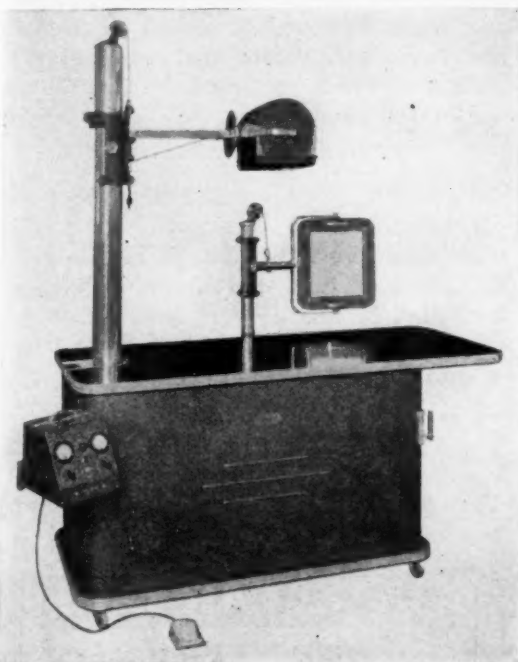
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An' Related Topics

(Continued from page xxviii)

State Rights and Smallpox

Where the health of the general population is at stake, the right of the states to run their own affairs in their own sweet way may not be the political blessing it is cracked up to be. At least, expert public health officials agree that this constitutional right is not without fault. Six states have no vaccination laws at all and many others are lax in the enforcement of the laws they have enacted. Result: The incidence of smallpox is higher in the United States than in other countries—2,462 cases last year.

Brahman Cattle

Brahman cattle were first brought to the United States in 1849. They have shown great ability to stand tropical heat in the open without shade. They are well suited for the Gulf Coast country. At the USDA experimental farm at Jeanerette, La., they are being crossbred to Aberdeen Angus's and Africander's with the object of producing a new beef breed for the humid Gulf Coast area.

Barkley's Betty, an Ayrshire, 21 years old, weighing 1,000 lb., owned by the Strathglass farm, Port Chester, N. Y., has given 197,802 lb. of milk containing 6,800 lb. of butterfat in her lifetime thus far, or in other figures, 98.9 tons of milk and 3.4 tons of butter.

A Polish school of medicine has been established in the University of Edinburgh. The teachers are officers of the Polish army serving in Britain.

IMPORTANT CHANGE IN BRUCELLA ABORTUS VACCINE PACKAGING

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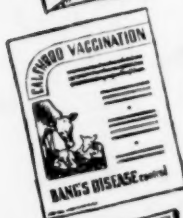


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